Dewart Lake Engineering Feasibility Study Kosciusko County, Indiana

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DEWART LAKE ENGINEERING FEASIBILIY STUDY KOSCIUSKO COUNTY, INDIANA

EXECUTIVE SUMMARY

The Dewart Lake Protective Association (DLPA) received an Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) grant to complete an engineering feasibility study on ravine stabilization projects along Dewart Lake's northern shore. The engineering study was based on work completed during the Dewart Lake Diagnostic Study (JFNew, 2005). The goal of the feasibility study was to develop feasible solutions to seven eroding ravines. To be deemed feasible, a project needs to be acceptable to property owners, receive regulatory agency support, be physically constructible, and be environmentally and socially justifiable.

This study developed feasible erosion and sediment control measures for seven ravines along the northern shore of Dewart Lake. Of the fifteen ravines that were investigated, these ranked as the most severely eroding and were considered to be the highest priority. Five of the seven ravines are located on the Camp Ella J. Logan (Camp Logan) Girl Scout property. The two remaining ravines were located near the northwest corner of the lake, south of CR 1000 N. and north of EMS D12 Lane, respectively. Proposed ravine stabilization projects employ the use of rock grade controls, wetland creation, slope stabilization, and rock channel stabilization to reduce erosion and limit sedimentation into Dewart Lake. Individual projects ranged from \$8,033 to \$32,475. The estimated cost for permitting and constructing all the proposed projects would be \$123,172, if all projects are constructed under one grant or with a combination of grants during the same time period. If projects are constructed on an individual basis, contractor mobilization and administrative fees would increase each project's estimated cost.

It is recommended that the Dewart Lake Protective Association move forward with obtaining grants from both the LARE program and the Great Lakes Commission Sediment Control program to construct as many of the proposed projects as possible during the fall of 2007 through 2008. Landowner permission has been granted for six of the seven projects. Implementing these projects would have a significant, positive impact on the water quality of Dewart Lake.



ACKNOWLEDGEMENTS

The Indiana Department of Natural Resources Division of Fish and Wildlife Lake and River Enhancement Program and the Dewart Lake Protective Association (DLPA) funded this feasibility and design study. Thanks to Ken Brehob and Gary Hogle from the DLPA for assisting JFNew during the study. Mr. Brehob coordinated meetings between the DLPA and JFNew and contacted affected landowners. Mr. Hogle accompanied JFNew personnel during the site visits on the Ella J. Logan Campgrounds and provided feedback on feasible designs within the camp property. Thanks to the many landowners that allowed JFNew personnel to survey ravines on their property for potential projects. Special thanks to the Steven and Melody Miller; Randolph and Tonja Busch; and the Limberlost Girl Scout Council for providing permission to construct the proposed projects. Thanks to the Dewart Lake Protective Association members for their support. JFNew key contributors to this project include Mark Pranckus, John Richardson, Wayne Stanger, Christine Dittmar, Maria Schaefer, Brian Neilson, and Sara Peel.



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DEWART LAKE ENGINEERING FEASIBILIY STUDY KOSCIUSKO COUNTY, INDIANA

1.0 INTRODUCTION

1.1 Background

Dewart Lake has historically exhibited good water quality and an ability to provide good fishing. However, over the past several years, lake residents, particularly long-time residents, have noted changes in the lake. Residents have observed a shift in the type of vegetation in the lake. Specifically, emergent vegetation beds have decreased in size, while more nuisance vegetation, including Eurasian water milfoil, appears to have expanded its coverage in the lake. Residents have also noted a decrease in the lake's water clarity after weekends of heavy boating use. These changes have negatively impacted the residents' enjoyment of the lake and increased their desire to protect the lake's health and future. JFNew conducted water quality sampling within Dewart Lake and Cable Run, the lake's only inlet stream, to identify potential water quality improvement projects in 2004. Results from these assessments can be found in the Dewart Lake Diagnostic Study (JFNew, 2005). According to the study, Dewart Lake currently possesses good water quality, particularly in comparison to other lakes in the region and throughout the state. However, there is evidence that the lake's water quality could degrade in the future. The study recommended addressing both watershed-level and in-lake issues. One of the watershed-level issues recommended to be addressed was the reduction of sediment reaching the lake through the management of actively eroding ravines. In 2005, the Dewart Lake Protective Association (DLPA) received a grant from the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) Program to conduct an engineering feasibility study. The purpose of the current study is to determine the design and construction feasibility of a ravine management project on the north side of Dewart Lake.

1.2 Goals and Objectives

The geographic scope of the study includes Dewart Lake and its 5,059-acre (2,049-ha) watershed in Kosciusko County. This feasibility study focuses on a series of steep ravines in the landscape in the north part of Dewart Lake's watershed (Figure 1). These ravines drain directly into Dewart Lake.

The goal of this study was to determine whether a ravine management project was feasible, and whether it could be designed and implemented within a reasonable time frame. A feasible project is defined as one that can physically be constructed, is acceptable to landowners, is economically and ecologically justifiable, and can receive regulatory approval. The feasibility study attempted to ensure project success by investigating all avenues that could potentially cause project failure.



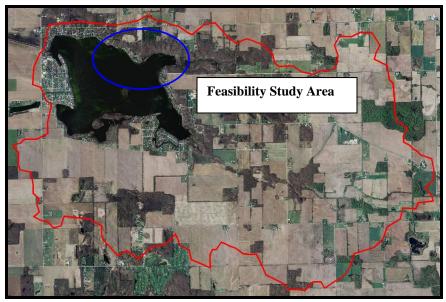


Figure 1. Engineering feasibility study proposed project location.

2.0 <u>DESCRIPTION OF THE STUDY AREA</u>

2.1 Location

The Dewart Lake watershed (14-digit hydrologic unit code 04050001200040) encompasses 5,059 acres (2,049 ha) in central Kosciusko County, Indiana (Figures 2 and 3), and lies immediately north of the north-south continental divide. Dewart Lake is a headwater lake in the Great Lakes Basin. Surface water drains to Dewart Lake via three primary routes. Cable Run drains approximately 2,160 acres (875 ha) southeast of the lake (Table 1). This stream empties into Dewart Lake at the lake's southeast corner. An unnamed intermittent stream/wetland system transports water from the eastern part of the watershed to Dewart Lake along the southern edge of the Limberlost Girl Scout Council property called Camp Ella J. Logan (Camp Logan). This system drains less than 15% of the watershed. The remainder of the land in the Dewart Lake watershed (1,624 acres or 657 ha) drains directly to the lake. This includes drainage from the ravines along the lake's northern shoreline, which were the primary focus of this project. Water from Dewart Lake flows north through Waubee Lake into the Elkhart River. The Elkhart River flows into the St. Joseph River, which eventually discharges into Lake Michigan near St. Joseph, Michigan.



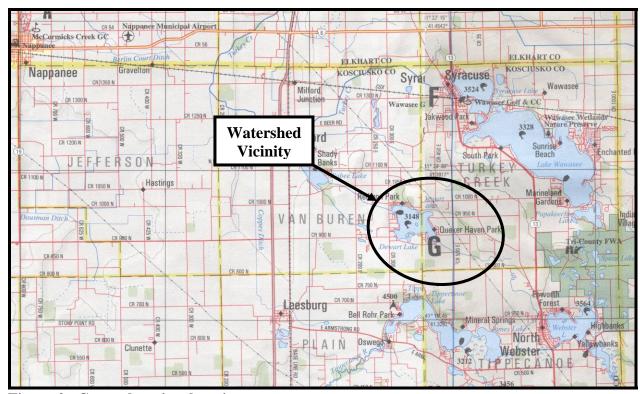


Figure 2. General project location. Source: DeLorme, 1998.

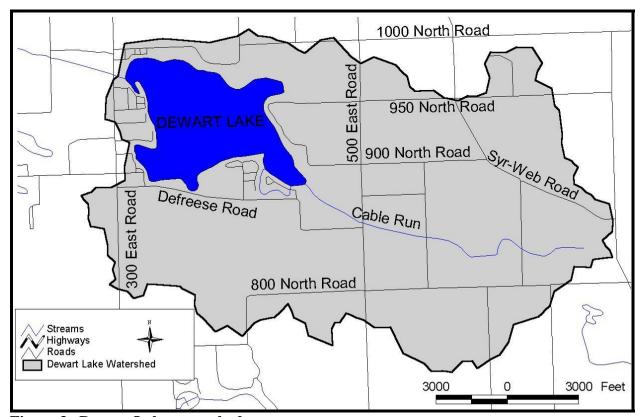


Figure 3. Dewart Lake watershed.



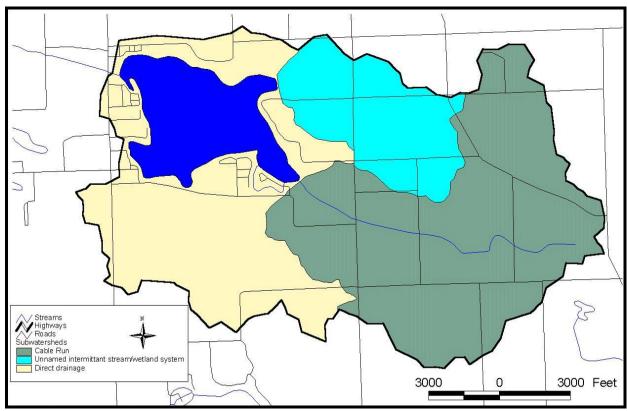


Figure 4. Dewart Lake subwatersheds.

2.2 Geologic History and Topography

Several glacial lobes rather than a single sheet of ice covered northern Indiana during the last glacial age. The Saginaw and Erie Lobes covered most of northeastern Indiana. The movement, stagnation, and melting of the Saginaw Lobe of the Wisconsin glacial age is largely responsible for the landscape covering the Dewart Lake watershed. The ridge that separates the Dewart Lake watershed from Lake Wawasee's watershed is part of an end moraine left by the Saginaw Lobe. The lower, less distinct ridge separating the Dewart Lake watershed from the Tippecanoe River Basin may also be part of an end moraine left by the glacial lobe. A complex mix of glacial till and outwash materials lies between the two ridges, while sand and gravel outwash materials dominate the very western edge of the Dewart Lake watershed. Approximately 300-350 feet (91-107 m) of unconsolidated glacial materials cover most of the Dewart Lake watershed. In the southeastern portion of the watershed, the thickness of this unconsolidated glacial material decreases to 250-300 feet (76-91 m). Antrim shale from the Devonian-Mississippian Period underlies the unconsolidated glacial material in the Dewart Lake watershed (Gutschick, 1966).

2.3 Land Use

The Dewart Lake watershed is located in the Northern Lakes Natural Region (Homoya et al., 1985). The Northern Lakes Natural Region occupies the north central and northeastern portion of Indiana. The Eel River marks the Northern Lakes Natural Region boundary on the southeast and the Maxinkuckee Moraine serves as the Region's western boundary. Prior to European settlement, the Northern Lakes Natural Region was a mixture of numerous natural community types including bog, fen, marsh, prairie, sedge meadow, swamp, seep spring, lake and deciduous forest (Homoya et al., 1985). Several of these natural community types likely covered the Dewart Lake watershed landscape in pre-settlement times. For example, upland forest dominated by red oak, white oak, black oak, shagbark hickory, and/or pignut hickory likely covered areas north and south of the lake. The lower elevation areas, such as the corridor along Cable Run and the unnamed intermittent stream/wetland complex east of Dewart Lake, were likely forested with tree species that are more tolerant of wet soil conditions. Common species may have included sycamore, American elm, red elm, green ash, silver maple, and red maple. Marsh habitat rather than open water may have been more common along the shallow edge of Dewart Lake in presettlement times. Today, about 70% of the watershed is utilized for agricultural purposes, including row crop and pasture (Table 1, Figure 5). Residential and commercial land use currently composes about 4% of the total watershed acreage. Forests, wetlands, and open water account for approximately 26% of the total watershed. The northern portion of the watershed where the ravines are located, the land use is primarily composed of low intensity residential and deciduous forest with row crop agriculture in the upper portion of the watershed (Figure 5).

Table 1. Land use in the Dewart Lake watershed.

Land Use	Area (acres)	Area (hectares)	% of watershed
Row Crops	3175.4	1285.6	62.8%
Open Water	556.6	225.4	11.0%
Deciduous Forest	512.2	207.4	10.1%
Pasture/Hay	363.4	147.1	7.2%
Woody Wetlands	220.5	89.3	4.4%
Low Intensity Residential	187.2	75.8	3.7%
Emergent Herbaceous Wetlands	33.3	13.5	0.7%
Evergreen Forest	4.1	1.7	0.1%
Urban Park Land	1.0	0.4	<0.1%
High Intensity Residential	2.2	0.9	<0.1%
High Intensity Commercial	2.3	0.9	<0.1%
Mixed Forest	0.4	0.1	<0.1%
Total	5058.6	2048.1	100.0%

Source: USGS/EROS Indiana Land Cover Data Set, Version 98-12.

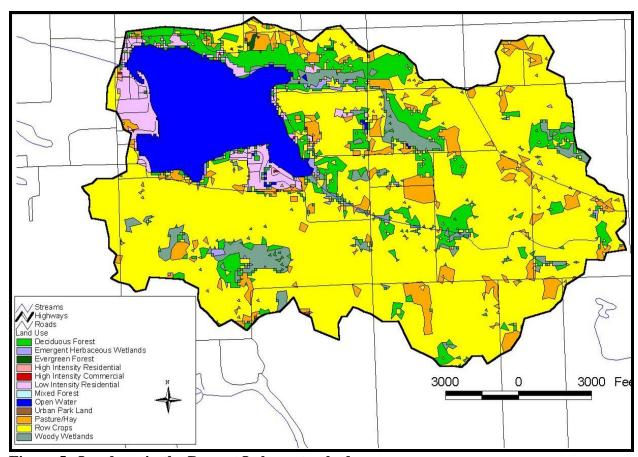


Figure 5. Land use in the Dewart Lake watershed.

2.4 Soils

Six major soil associations cover the Dewart Lake watershed (Figure 5). These soil associations are the Riddles-Wawasee soil association, the Wawasee-Crosier-Miami soil association, the Crosier-Barry soil association, the Shipshe-Carmi soil association, the Ormas-Kosciusko soil association, and the Riddles-Ormas-Kosciusko soil association. The Riddles-Wawasee soil association covers the largest portion of the Dewart Lake watershed, bordering much of Dewart Lake's shoreline and extending out to the east and south from the lake. The Riddles-Wawasee soil association is the third most common soil association found in Kosciusko County, covering approximately 10% of the county landscape. The Wawasee-Crosier-Miami soil association lies along the northern and western shorelines of Dewart Lake and the covers the headwaters of Cable Run along the eastern boundary of the watershed. The Wawasee-Crosier-Miami soil association is the most common soil association in Kosciusko County, covering approximately 28% of the county landscape. The Crosier-Barry soil association, the Shipshe-Carmi soil association, the Ormas-Kosciusko soil association, and the Riddles-Ormas-Kosciusko soil association cover much smaller portions of the Dewart Lake watershed (Staley, 1989).



2.4.1 Highly Erodible Soils

The Natural Resources Conservation Service (NRCS) maintains a list of highly erodible soil units for each county. Table 2 lists the soil units in the Dewart Lake watershed that the NRCS considers to be highly erodible. As Figure 6 indicates, potentially highly erodible soils cover a substantial portion (2,162 acres (874.9 ha) or nearly 43%) of the Dewart Lake watershed. This acreage is spread throughout the watershed. Highly erodible soil exists on approximately 104 acres (42.1 ha) or approximately 2% of the watershed. Most of the highly erodible soil units are located within the vicinity of and bordering Dewart Lake including the feasibility study area along the northern shore.

Table 2. Highly erodible and potentially highly erodible soils units in the Dewart Lake watershed.

Soil Unit	Status	Soil Name	Soil Description
BoC	PHES	Boyer loamy sand	6-12% slopes
ClC	PHES	Coloma loamy sand	6-12% slopes
KoB-KoC	PHES	Kosciusko sandy loam	2-12% slopes
KoE	HES	Kosciusko sandy loam	18-30% slopes
KxC3	HES	Kosciusko sandy clay loam	8-15% slopes, severely eroded
MbC	PHES	Metea loamy sand	6-12% slopes
MlB	PHES	Miami loam	2-6% slopes
MsB	PHES	Miami-Owosso-Metea complex	2-8% slopes
MsD	HES	Miami-Owosso-Metea complex	10-25% slopes
MzB	PHES	Morley-Glynwood complex	1-4% slopes
OrC	PHES	Ormas loamy sand	6-12% slopes
Pg	PHES	Pits, gravel	
RIB-RID	PHES	Riddles fine sandy loam	2-18% slopes
RxB-RxC	PHES	Riddles-Ormas-Kosciusko complex	2-12% slopes
ShB	PHES	Shipshe sandy loam	2-6% slopes
WlB	PHES	Wawasee fine sandy loam	2-6% slopes
WlC2	PHES	Wawasee fine sandy loam	6-12% slopes, eroded
WlD2	HES	Wawasee fine sandy loam	12-18% slopes, eroded

^{*} PHES=Potentially highly erodible soil; HES=Highly erodible soil

Source: 1988 USDA/SCS Indiana Technical Guide Section II-C for Kosciusko County



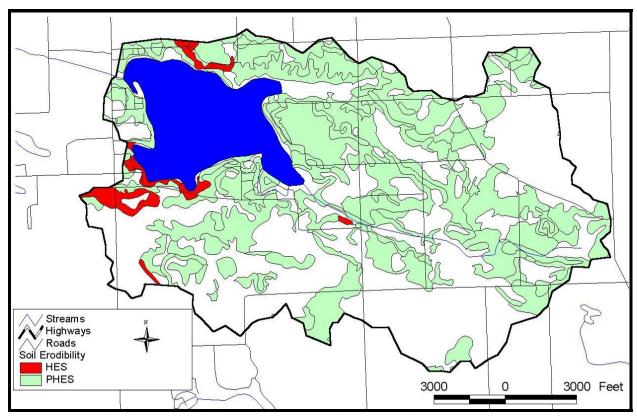


Figure 6. Highly erodible and potentially highly erodible soils in the Dewart Lake watershed.

2.5 Prior Studies

Table 3 lists prior studies conducted in the Dewart Lake watershed. Most studies conducted in the area have been focused on documenting existing fishery conditions within the lake. More recent work focused on the lake's plant community and on watershed and water quality improvement projects.



Table 3. Prior studies conducted in the Dewart Lake watershed.

Year	Entity	Topic	Study
1972	IDNR	Fisheries	Coldwater Fishery Potential
1976	IDNR	Fisheries	Dewart Lake, Kosciusko County, Fish Management Report
1982	IDNR	Fisheries	A Fishery Survey at Dewart Lake and First-Year Walleye Management
1984	IDNR	Fisheries	First-Year Survival of 3-4 Inch Walleyes in Dewart Lake
1985	IDNR	Fisheries	Survival of 3-4 Inch Walleye Fingerlings Versus Fry in Dewart Lake
1985	IDNR	Fisheries	Results of Walleye Stockings at Dewart Lake
1990	IDNR	Fisheries	Results of Walleye Stockings at Dewart Lake
		Water Quality	Indiana Clean Lakes Volunteer Monitoring Program
1994	CLP	Water Quality	Indiana Clean Lakes Assessment
1995	IDNR	Fisheries	Dewart Lake, Kosciusko County, Fish Management Report
1997- 2001	KCHD	Water Quality	Stream Water Quality Monitoring Program
2000	CLP	Water Quality	Indiana Clean Lakes Assessment
2003	IDNR	Fisheries	Dewart Lake, Kosciusko County, Fish Management Report
2004	DU, EC	Wildlife	Changes in a Turtle Community for an Increasingly Human- impacted Lake: A Long-term Study
2005	JFNew	Watershed Management	Dewart Lake Diagnostic Study (including water quality assessments and aquatic vegetation surveys)

DU, EC=Denison University and Earlham College

JFNew=J.F. New and Associates

KCHD=Kosciusko County Health Department

IDNR=Indiana Department of Natural Resources

3.0 OVERVIEW OF POTENTIAL PROJECTS

A series of steep ravines cover the landscape north of Dewart Lake. During a site investigation in February 2006, JFNew personnel, along with Gary Hogle from Camp Ella J. Logan Girl Scout Camp, identified 15 ravines on the north end of the lake (Figure 7). The ravines varied in size from large ravines that could be identified from aerial photos and USGS topographic maps to several smaller ravines that were only identifiable after a site investigation. The slopes of the ravines exhibit grades of 10% or higher. Many of the soil units in these areas are considered highly or potentially highly erodible (Figure 6). Given these site conditions, it is not surprising that several of the ravines are actively eroding. Active headcuts at the top of some of these ravines and slumping side slopes were observed during site inspections conducted during the course of this study. Additionally, coarse, sandy material that appeared to have originated from the ravines was noted along the shallow edge of Dewart Lake in the cove adjacent to the Camp Logan property.





Figure 7. Location of the 15 ravines surveyed by JFNew in February 2006.

Sediment reaching Dewart Lake has the potential to impair the lake via several mechanisms. Of greatest concern to the residents is the impact sediment can have on the lake's water clarity. During a public meeting conducted in 2004, residents complained of poor water clarity following weekends of heavy use. Sediment from actively eroding ravines contributes to this problem. The sediment also reduces lake depth which can affect swimming and other recreational uses of the lake. Lastly, nutrients attached to sediment that reaches the lake can promote algae and rooted plant growth, which in turn can impact recreational use of the lake.

Some of the erosion occurring within the ravines is natural. The landscape's steep slopes coupled with the sandy soil naturally predispose the ravine area to erosion. However, erosion rates within the ravines were likely slower in pre-settlement times. In pre-settlement times, forest likely covered the landscape north of Dewart Lake. Due to the structure and physical composition of forested land, forested land typically has very low stormwater runoff volumes and flow rates. To understand this, it is helpful to consider the path of rain falling on a forested landscape. Some portion of the rain falling on forested land never reaches the ground. The multi-layered canopy of forested land captures this portion of rain. Of the rain that does reach the forest floor, herbaceous ground cover and decaying organic matter absorb another portion of the total rain volume. An additional portion of the total rain volume is infiltrated into the forest soil. This leaves a very small amount of rain that actually leaves the forest floor as overland runoff. This low stormwater runoff volume and consequently low flow rate translates into lower potential for soil erosion.

At some point during settlement of the Dewart Lake watershed, settlers cleared much of the forested areas to allow for agricultural production. Historical aerial photography confirms that much of the land at the top of the ravines has been, and in some cases still is, in agricultural production. Agricultural land has significantly higher stormwater runoff volumes and rates compared to forested land. These higher stormwater runoff volumes and rates are increased even further when agricultural land is tiled to improve drainage. The result is an increase in the

volume and rate of stormwater runoff reaching the ravines as the water drains toward the lake. The increased volume and rate of stormwater runoff increases the erosion within the ravines.

While the shift from forested land to agricultural land use likely accelerated erosion within the ravines north of Dewart Lake, the conversion of agricultural and/or forested land to residential land use that is occurring today presents an even greater concern for erosion in the ravines. While stormwater runoff volumes and rates are greater on agricultural land compared to forested land, they are even higher on residential land. Residential land can have a significant amount of impervious surface (roads, sidewalks, driveways, houses, etc.) associated with it. Impervious surface provides no infiltration of stormwater. Even if common stormwater management practices are utilized, the potential is high for increased erosion in ravines that released stormwater runoff from residential areas.

The Camp Logan property has taken steps to address the erosion concerns associated with the ravines on their property. The Camp has worked with the Kosciusko County Soil and Water Conservation District to construct water and sediment control basins, detention basins, and a sediment trap on the parcel (Figure 8). Additionally, the Camp has installed a grassed waterway along an eroding gully. The Camp has also retired active agricultural land and planted these areas to trees and prairie habitat.



Figure 8. Aerial map of previous sediment control projects on the Ella J. Logan Camp property.

A multi-pronged approach was recommended to address the erosion problem within the ravines along the northern edge of Dewart Lake (JFNew, 2005). First, the watershed at the top of the ravines was examined to determine whether a reduction of stormwater runoff from these areas was possible. Retiring agricultural land and planting the land to forest or prairie habitat would reduce stormwater runoff from areas up-gradient of the ravines. Use of the Conservation Reserve Program (described below) may be a cost-effective means to achieve this goal. Additionally, the forested lot southeast of the intersection of the County Road 400 East and County Road 1050



North should be explored for agricultural tiles. This area was formerly farmed and drainage tiles may still exist there. These tiles can be removed (provided they do not drain active agricultural land north and west of the wood lot) since the area is no longer used for agricultural production. Removal of tiles would help restore the watershed natural hydrological regime and reduce stormwater runoff reaching the ravines.

Once the areas up-gradient of the ravines were examined, focus was directed to the areas at the top of the ravines. The Camp Logan property has detention basins located at the top of several of the ravines. If space is available, other ravines would benefit from having similar detention basins located immediately upstream of the start of the ravine. These basins capture stormwater runoff from the surrounding area and slowly release the runoff water into the ravines, reducing the erosive potential of the water.

Erosion control may be possible within the ravines themselves. Depending upon the slope and soil composition, it may be possible to install a series of rock grade controls in certain ravines. Rock grade controls reduce erosion by pooling water behind them, slowing the velocity and erosive potential of runoff. As the water slows behind the check dam, some of the sediment in the runoff will drop out of suspension and remain trapped behind the check dam. Additional sediment traps may also be an option in some of the ravines. Like many of the other practices described above, sediment traps slow and store water for release in the future. As water pools within a sediment trap, heavier particles drop out of suspension, reducing the sediment load that reaches the lake.

Finally, with respect to reducing erosion from the ravines, careful planning will be necessary when developing the land around or up-gradient of the ravines for residential or commercial use. Residential/commercial development of these areas should employ conservation designs to reduce impervious surfaces and maximize buffer zones and infiltration areas. Other best management practices that should be considered are the use of grassed pavers in place of roads, driveways, and sidewalks; reduction in street, driveway, and sidewalk widths; the use of vegetated roadside swales rather than curb and gutter systems; and the use of green rooftops, rain gardens, and/or rain barrels to keep stormwater on individual lots. Reducing the volume and velocity of stormwater reaching nearby ravines will be essential to limiting erosion within these ravines.

3.1 Selected Projects

JFNew identified seven ravines on the north end of Dewart Lake where soil erosion was occurring and creating sedimentation in the lake (Figure 9). Ravines were selected on the basis of the amount of erosion occurring and feasibility of designing a cost-effective solution to stop or slow erosion. Several ravines had multiple projects associated with them. Listed below is a breakdown of the seven selected projects. Each project will be described in greater detail in Section 4.0 Selected Projects Review.





Figure 9. Selected project site locations along the northern shoreline of Dewart Lake.

- Site 1 (Camp Logan, Ravine 2) Install three rock grade control structures along the main ravine, one rock grade control structure in a side ravine, rock stabilization in a side ravine, and a wetland at the top of one of the side ravines.
- Site 2 (Camp Logan, Ravine 3) Install two rock grade control structures along the main ravine and one rock grade control in a side ravine.
- Site 3 (Camp Logan, Ravine 5) Stabilize the slope of a slumping a ravine, install two rock grade controls in a ravine to provide stormwater retention and clean sediments from the existing sediment trap.
- Site 4 (Camp Logan, Ravine 6) Create a wetland at the top of the ravine.
- Site 5 (Camp Logan, Ravine 7) Change the outlet pipe elevation on the existing detention pond to create more stormwater storage. Re-route the existing emergency spillway directly into a ravine with a rock chute. Stabilize the side of a ravine eroding due to the current emergency outlet configuration. Create a rock chute in the ravine containing the pond outlet pipe.
- Site 6 (1000 N, Ravine 14) Install a series of small rock grade controls and native plants to protect channel and slow down water before it enters Dewart Lake.
- Site 7 (EMS D12 Lane, Ravine 15) Install rock-lined channel stabilization and a sump to store water before it is enters a culvert.

3.2 Alternative Projects

The remaining eight ravines were examined during a site visit by JFNew staff in February 2006. These sites were not selected for feasibility and design because they either did not have any major erosion issues, a feasible design could not be determined, or the seven selected projects were of greater importance. Two ravines on the Camp Logan Girl Scout Property, Ravine 1 and Ravine 9, had erosion occurring in the upper reaches of the ravines. The erosion in Ravine 1 was

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greater than in Ravine 9; however, both were significantly less than the other ravines on the property. At some point in the future, these ravines may need to be addressed. Ravines 4, 8 and 10 (also located within the camp property) contained no major erosion problems. These ravines will need to be monitored as land use within the watershed changes.

West of Camp Logan, there were several large, deep, narrow ravines with steep slopes. After inspection, it was concluded that there were not significant erosion problems occurring. However, flooding and residential housing stormwater management was a greater issue. For Ravine 11, it is suggested that the agriculture field at the top of the ravine remain in the Conservation Reserve Program (CRP) or be reforested to prevent increased stormwater runoff. At Ravines 12 and 13, a large house built on top of the slope borders one side of each ravine. Currently, the homeowner uses drainage tile to capture the stormwater from its downspouts and tiles it directly to the bottom of each ravine (Figure 7). Although this practice does not allow for any infiltration of stormwater, it eliminates the erosive power of the water as it runs down the side of a ravine because the runoff is contained within a drainage pipe. The result is less ravine slope erosion, but more downhill flooding. It is suggested that local property owners be educated on stormwater management practices such as rain gardens and made aware of the implications of their practices on their neighbors and the lake.

4.0 <u>SELECTED PROJECTS REVIEW</u>

4.1 Project Description - Camp Logan, Sites 1 - 5

Site 1 - Ravine 2 - Camp Logan

Site 1 (Ravine 2) is a significantly eroding ravine located downstream from an existing detention pond constructed on the Camp Logan property. There are three side ravines that enter the main ravine. The ravine stabilization design consists of using a combination of five rock grade controls and creating a wetland at the top of one of the side ravines. Three of the proposed grade controls are located where previous attempts using a similar technique to reduce erosion occurred (Figures 10 - 12). These structures failed because rock was placed only on one side of the ravine channel, which resulted in stormwater shifting to the opposite side of the channel. This eventually resulted in water eroding away the base of the slope. The new grade controls will be constructed using rock already present at these locations from the original stabilization techniques. Using the existing rock from the failed structures will be cost effective. A fourth rock grade control will be placed where a side ravine joins the main ravine. Additionally, rock will be placed in the side ravines in appropriate areas to prevent further erosion.

In addition to work within the ravine, a wetland at the top of a side ravine will be constructed. This will help to reduce the volume and velocity of water flowing through Ravine No. 2 during storm events. The wetland will also provide wildlife habitat for amphibians and frogs and educational opportunities for participants at the camp.





Figure 10. Looking at the erosion downstream of the failed rock grade control at Site 1-1.



Figure 11. Looking upstream at the severely eroding slope associated with the failed rock grade control structure at Site 1-3.



Figure 12. Looking upstream at erosion created by a failed grade control structure

Site 2 - Ravine 3 - Camp Logan

Site 2 (Ravine 3) is located directly downhill from the Girl Scout camp office. It consists of one main ravine with a smaller side ravine (Figure 13 and Figure 14). The proposed project will include installing rock at the top of the side ravine to stop a headcut that has formed. Two rock grade controls are proposed on the main ravine. These will help to decrease water velocity before it reaches Dewart Lake.



Figure 13. View looking upstream at the start of the main ravine at Site 2.





Figure 14. View looking upstream at the start of the side ravine at Site 2.

Site 3 – Ravine5 – Camp Logan

Site 3 (Ravine 5) is located adjacent to the entrance road into the Camp Logan facilities (Figure 8). It consists of one main ravine with a severely eroding section. An NRCS-funded pipe drop structure is located at the base of the ravine. The proposed project will attempt to stabilize the slope and provide water retention to allow for sediment to drop out of the stormwater. The slope will be stabilized by installing a rock toe along the eroding section of ravine, and using a combination of native plants, shrubs, and erosion control material (Figure 14). A rock grade control structure will be installed downstream of the eroding ravine slope to reduce the erosive force of the stormwater. An additional, larger rock grade control will be installed downstream of the first rock grade control structure to retain stormwater allowing sediment to settle out (Figure 15). Lastly, the accumulated sediment at the base of the existing pipe drop structure will be removed to increase the sediment storage capacity of the structure (Figure 16).





Figure 15. Severely eroding slope along Ravine 5.



Figure 16. Location of proposed large rock grade control across the channel at Ravine 5.



Figure 17. View looking upstream at the amount of accumulated sediment near the existing pipe-drop structure on Ravine 5.

Site 4 - Ravine 6 - Camp Logan

Site 4 (Ravine 6) is located to the west of Ravine 5. Ravine 6 consists of two small ravines that combine to form one main ravine (Figure 18). There is no major erosion occurring along the main ravine; however, a head cut is occurring at the top of one of the small ravines (Figure 19). If not addressed, this headcut will continue to erode, eventually contributing a significant amount of sediment to the lake. The proposed project will create a small wetland at the top of both of the small ravines. The wetland will retain stormwater, allowing for sediment to drop out of the water flowing downstream, thereby reducing sediment loading to Dewart Lake. One ravine will be used as the primary spillway, which will release water from the wetland at a set elevation after it fills up during a storm event with stormwater. The head of the second small ravine will be regraded so it can function as the wetland's emergency spillway, which will carry water overflowing from the wetland due to significant or "historical" storm events.





Figure 18. Proposed location of wetland creation at Site 4.



Figure 19. Headcut that is occurring at the top of Ravine 6 (Site 4).

Site 5 - Ravine 7 - Camp Logan

Site 5 (Ravine 7) is located downstream of the existing pond on the Camp Logan property. Ravine 7 consists of one small ravine with severely eroding slopes due to stormwater from the pond's emergency spillway and a second short ravine that serves as the primary spillway for the pond (Figure 20 and Figure 21). The slopes are eroding in the first ravine because the existing pond has very little stormwater storage capacity (approximately 0.2 feet of freeboard) and overflows through the emergency spillway on a regular basis (Figure 22). Stormwater enters the ravine from the side slopes, creating a headcut that will eventually work back towards the spillway and pond. The proposed design will stabilize the eroding slopes by using a combination of native plants, shrubs, and erosion control materials. The emergency spillway will be regraded so that water from the spillway flows through a controlled course into the head of the

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ravine. This will restore what was likely the original water path. The head of the ravine will be lined with rock to dissipate the water's energy and allow for sediment to drop out. A rock check dam will be added to prevent any headcuts from downstream migrating further up the ravine. The ravine that is used for the primary spillway will be lined with rock to dissipate the water's energy; reducing the erosive potential of the water.

In addition to the slope stabilization and emergency spillway re-grading, the primary outlet pipe within the pond will also be adjusted to provide more stormwater storage. Based on the current conditions, the elevation of the pipe can be lower to create more storage.



Figure 20. Severely eroding slopes on the side ravine at Site 6.



Figure 21. The base of the main ravine which handles the water from the outlet pipe. Water from the emergency spillway enters the ravine from a side ravine located on the right-hand side in the picture.





Figure 22. Primary outlet for existing pond at Site 5. Note that the invert of the pipe is only 0.2 feet below the elevation of the emergency spillway resulting in very little stormwater storage.

4.1.2 Project Design and Construction Specifics

Sediment and erosion reduction projects within a watershed need to be designed based on the problem needing to be addressed, the goal of a treatment (i.e. reduce erosion or filter sediment), and the feasibility of a project to meet the goal. The seven selected ravines along the northern shore of Dewart Lake all experience the same problem: severely eroding side slopes that are causing significant inputs of sediment into the lake. Based on observations from the watershed and a tour of the ravines, erosion within a ravine, not sediment that is being transported from the watershed through the ravine, is the major source of sediment to Dewart Lake. Erosion within the ravines is being caused by the velocity and volume of stormwater. The velocity of water through a ravine is a function of both the characteristics of the watershed (i.e. watershed gradient, land use, and soils) and the ravine gradient. Erosion within a ravine can increase the gradient, which in turn, increases the velocity. With greater velocity, stormwater has a greater erosive potential. Once erosion in a ravine starts, a positive feedback cycle between increased velocity and increased gradient can develop.

Rock Grade Controls, Key Trenches, and Channels

Generally, four approaches will be used to reduce erosion and sedimentation into Dewart Lake. The first approach is to reduce the gradient within a ravine. This will be accomplished by installing rock grade control structures within five of the seven ravines. By decreasing the gradient of a ravine, the water velocity through the ravine will decrease. This will result in less erosive potential from stormwater thereby resulting in less potential for sediment transport through the ravine. Rock grade controls work by presenting an elevated hard point within a stream channel or ravine that water hits. Once water impacts the hard point, it begins to back up through the ravine. As water backs up, velocity is decreased and sediment that was being transported through the ravine falls out of suspension. Following a storm event, water will rise behind a rock grade control to the top elevation of rock within the structure. Once the water



level reaches the top of the rock grade control, it is released downstream through a rock-lined exit slope and rock chute apron. The result is the controlled release of stormwater.

A second approach will be to use rock key trenches and rock-lined channels to stabilize an eroding channel and dissipate some of the energy associated with stormwater runoff. The ravine's gradient will not decrease using these techniques. However, the gradient will be prevented from increasing due to erosive forces such as headcut formation.

A third approach will be used to stabilize the eroding slopes along two ravines. The erosion along the slopes of these ravines is significant enough that rock grade controls and rock stabilization would not be effective enough to reduce erosion. Slope stabilization reduces a significant source of sediment from the ravines into Dewart Lake.

The first three approaches are effective in either reducing the velocity of stormwater through a ravine (rock grade controls) or resisting the erosive force of stormwater (rock stabilization or slope stabilization). However, none of the approaches attempt to directly reduce stormwater volume into a ravine. The fourth approach will be to create additional stormwater storage through the creation of wetlands within the watershed so that stormwater slowly gets released into ravines. A reduction in the volume of stormwater will also benefit concurrent measures within a ravine to reduce velocity.

To properly design treatments based on the four approaches, a run-off curve was developed by incorporating data from land use and watershed area. The run-off curve was then used along with watershed soils and gradients to estimate peak stormwater volume and velocity (Appendix A). Rock grade controls were based on a 50-year storm event and wetland creations were based on 10-year and 25-year storm events. Knowing the peak stormwater volume and velocity allowed for proper sizing of the dimensions for rock grade control entrance slopes, exit slopes, chute apron lengths, structure side slopes, and structure openings as well as the amount of storage required by a created wetland.

Rock grade controls, rock key trenches, rock-lined chutes, and channel stabilization will be constructed in a similar fashion throughout the project site. Exact dimensions and relative elevations shall be referenced from the plan set and conform to existing field conditions. (See Appendix B for plan set.) A minimum of six inches of excavation will occur throughout the length of the entrance, exit, side slopes, and chute apron for rock grade controls and throughout the treatment area for a rock-lined chute or channel stabilization. A key trench will be excavated to a depth measuring one foot below existing grade and have a width of two feet for both rock grade controls and rock key trenches. Geotextile fabric will be laid down in the trench and throughout the length of the grade control entrance, exit, and side slopes prior to the addition of rock. Rock will have a minimum average diameter of six inches.

For sites 1-1, 1-3, 1-4, and 1-5, rock grade controls will be constructed at the location of a failing grade control structure. The existing rock will provide an excellent base for a new structure and will reduce the cost of materials. The location of the remaining proposed rock grade controls, rock key trenches, and rock-lined channel stabilization will be referenced from the plan set and field fit to existing conditions.



Open Water Wetlands

Site 1-2 and Site 4 will be small (0.15 acre and 0.38 acre, respectively), open water wetlands located at the heads of two severely eroding ravines. JFNew personnel evaluated the potential for the sites to become fully-functioning wetlands by using a soil probe to extract soil cores to a depth of approximately six feet from several locations. Soil cores were evaluated at one foot increments by visually inspection the soil core and by qualitatively determining the clay content. Clay content was evaluated based on whether a minimum of a one inch ribbon could be produced when working the material between the thumb and index finger. It was important that the subsoils contained enough clay for the wetland basin to hold and retain water. Additionally, the ability of excavated material to be compacted and used as material for the wetland berm was also key in wetland location and designs. Each site contains appropriate soils for wetland creation. If a site contained less clay, the design would have been modified to be more of an ephemeral wetland, which would have also served an equally important function of reducing the sediment loading to Dewart Lake. Each site was also surveyed with a laser level and Trimble XRS GPS unit to determine the relative elevations of the surrounding site. This information along with data about the watershed size, soils, and land use were used to determine the volume of stormwater runoff and the size of each potential wetland. The shape of each wetland was determined by the elevation of the surrounding area. (See Appendix B for plan set.)

The wetland at Site 1-2 will be constructed in a triangular shape by excavating material to the designed depth in accordance with the plan set. The triangular shape for Site 1-2 matches the surrounding topography to minimize the amount of material that will need to be removed to create a wetland while providing the function of stormwater storage. The removed material will be used to create an "L-shaped" berm on two sides of the triangle. The same principal was applied to the design of the wetland at Site 4. The wetland will be constructed to a rectangular shape by excavating material to the designed depth according to the plan set. The removed material will be used to create a "U-shaped" berm on three sides of the rectangle. The berm will be constructed to the specified dimension so that each wetland can retain a specified amount of stormwater (6,534 cubic feet and 17,538 cubic feet for Sites 1-2 and 4, respectively). If the water level exceeds the capacity of the wetland and water overflows the wetland berm, the berm is designed so that a catastrophic failure of the berm structure will not result. Additionally, an emergency spillway will be constructed at designated locations 0.5 foot below the top of the berm to allow for a controlled release of excess water.

A principal spillway will be installed in each wetland. An 8-inch diameter PVC pipe (Schedule 35) will be installed at a designated elevation approximately two feet above the bottom elevation of each wetland. A baffle or anti-vortex device will be connected to the pipe. Two square anti-seep collars measuring 4 feet on each side will be installed along the pipe within the berm. All pipe connections will be watertight. The 8-inch diameter pipe will allow for the release of water during a storm event as the wetland reaches capacity. The amount of water released by the 8-inch pipe into each ravine will be significantly less than the volume of stormwater that would enter the ravine if the wetlands were not present.

Both the wetland edge and approximately 10 feet of open water along the shoreline of each wetland will be planted with a mix of seed and plant plugs. The aquatic vegetation will act to



filter any sediment that is carried in the stormwater from the watershed. During the growing season, the nutrient concentration of stormwater will be reduced by uptake from the vegetation as well. A 25-foot wide (minimum) prairie buffer will be established along the perimeter of the wetland. The buffer will also act as a sediment filter and slow the flow of stormwater before it enters the wetlands. An herbicide application should occur prior to planting to kill the existing turf grass and agricultural weeds. Two large (24 – 36 inch diameter) trees, including branches and/or root wads, will be added to each wetland basin during construction. During wetland construction, several trees will need to be removed along the south boundaries of the wetlands. Every attempt will be made to re-use these trees within the new wetlands. The purpose of these trees will be to provide habitat for turtles, frogs, and other wildlife. The trees will be solid without major decay to ensure that they provide structural habitat for the longest amount of time before decaying. The trees may need to be anchored using cable and "t-posts" if it appears that they will float and move around the wetland. If large enough trees are used, this should not be an issue.

Slope Stabilization

The eroding ravine slopes at Sites 3 and 5 will be stabilized by installing a rock toe along the base of the slopes along with a combination of erosion control blankets, native shrubs and grasses, and large logs to stabilize the slope from the rock toe to the top of the slope. The large logs and erosion control blankets provide immediate slope stabilization by preventing further slumping of the slope. The root structure of native shrubs and grasses will provide additional long-term stabilization after they become established. Large logs (between 12 and 18 inches in diameter) will be installed along the rock toe in an end-to-end fashion and anchored to the slope using metal "t-posts" installed three to five feet on-center. Serviceable logs are considered to be one that were recently cut or are solid without decay. Hollow logs and visually decaying logs will not be used. Erosion blanket (North American Green (NAG) C-125BN or equivalent) will be rolled out with approximately one-third of the blanket behind the logs and the remaining portion hanging over the logs. Soil will be backfilled and compacted by hand or with machinery to the height of or near the top of the logs. Seed will be installed and the erosion blanket will be folded over to cover the backfilled soil. A combination of 6-inch sod staples and wood stakes will be used to anchor the erosion blanket. This process will be repeated along the eroding slope until the top of the slope is reached. (See plan set in Appendix B.)

Pond Alterations

The current elevation of the existing pond at Site 5 will be lowered by cutting approximately 2 feet off of the end pond's outlet pipe (Figure 22). The pipe is set at an angle within the pond so that removal of a two foot section will result in a pond storage elevation that is approximately 0.5 – 0.8 feet lower than the current elevation. By decreasing the permanent pool of water, an increase of approximately 0.7 – 1.0 foot of freeboard stormwater storage will result. By increasing the storage in the existing pond and re-grading the emergency spillway (see plan set in Appendix B), the rock grade control, rock-lined chute, and slope stabilization treatments within the ravine at Site 5 will be more effective because the volume and velocity of stormwater will be reduced.



4.1.3 Cost Estimates

The cost of each site was estimated on an individual site basis. Each project has an associated construction service cost that includes equipment and labor, a mobilization fee, and a material cost. A ten percent construction contingency has been added to handle unforeseen factors such as an increase in material costs or fuel costs that may affect a contractor's ability to complete the work as designed. A 15% construction oversight fee has been added to allow for the Dewart Lake Protective Association to contract the bid administration and construction inspection services to a private contractor. Administrative services were left out of the cost estimates for each project and typically cost \$4,000. That cost is relatively the same if one project is completed or if several projects are completed. A more detailed explanation is provided in Section 4.4. An example of bid documents can be found in Appendix C to facilitate the implementation of this project.

The opinion of the probable cost is \$32,475 for installing four rock grade controls and one pond at Site 1 (Table 4).

Table 4. Probable cost estimate for Site 1.

Item	Cost	Unit	Quantity	Total
Construction Services -				
Equipment and Labor	\$12,708	Each	1	\$12,708
Mobilization/Demobilization	\$2,500	Each	1	\$2,500
Rip rap	\$30	Ton	263	\$7,890
Antiseep Collar	\$78	Each	1	\$78
8" Schedule 35 PVC pipe	\$6.90	Linear Foot	100	\$690
8" Bar guard	\$36	Each	1	\$36
Wetland Plant Plugs	\$2.00	Each	300	\$600
Custom Wetland Seed Mix	\$1,150	Acre	0.4	\$460
Prairie Buffer Seed Mix	\$975	Acre	1	\$975
Erosion Control Material	\$1.00	Square Yard	640	\$640
Geotextile Fabric	\$0.88	Square Yard	442	\$389
Construction Subtotal				\$26,966
	10% of construction			
Construction Contingency	subtotal			\$1,273
Construction Oversight	15% of total construction	on services		\$4,236
Total				\$32,475

The opinion of the probable cost is \$8,033 for installing two rock grade controls and rock stabilization at Site 2 (Table 5).

Table 5. Probable cost estimate for Site 2.

Item	Cost	Unit	Quantity	Total
Construction Services –				
Equipment and Labor	\$2,484	Each	1	\$2,484
Mobilization/Demobilization	\$2,500	Each	1	\$2,500
Rip rap	\$30	Ton	34	\$1,020
Geotextile Fabric	\$1.00	Square yard	120	\$120
Construction Subtotal				\$6,124
	10% of construction			
Construction Contingency	subtotal			\$861
Construction Oversight	15% of total construction	n services		\$1,048
Total				\$8,033

The opinion of the probable cost is \$25,229 for installing two rock grade controls and slope stabilization at Site 3 (Table 6).

Table 6. Probable cost estimate for Site 3.

Item	Cost	Unit	Quantity	Total
Construction Services –				
Equipment and Labor	\$11,484	Each	1	\$11,484
Mobilization/Demobilization	\$2,500	Each	1	\$2,500
Rip rap	\$30	Ton	134	\$4,020
Geotextile Fabric	\$1.00	Square Yard	200	\$200
Erosion Control Blanket	\$1.56	Square Yard	388	\$605
Custom Seed Mix	\$175	Acre	1	\$175
Bare Root Trees	\$1.00	Each	175	\$175
Wood Stakes or Metal Posts	\$4	Each	175	\$700
Staples	\$42	Box	2	\$84
Construction Subtotal				\$19,943
	10% of construction			
Construction Contingency	subtotal			\$1,994
Construction Oversight	15% of total construction	n services		\$3,291
Total				\$25,229

The opinion of the probable cost is \$21,710 for creating a wetland at Site 4 (Table 7).

Table 7. Probable cost estimate for Site 4.

Item	Cost	Unit	Quantity	Total
Construction Services –				
Equipment and Labor	\$7,641	each	1	\$7,641
Mobilization/Demobilization	\$2,500	Each	1	\$2,500
Antiseep Collar	\$78	Each	2	\$156
8" Schedule 35 PVC pipe	\$6.90	Linear Foot	100	\$690
8" Bar guard	\$36	Each	1	\$36
Wetland Plant Plugs	\$2.00	Each	300	\$600
Custom Wetland Seed Mix	\$1,150	Acre	0.4	\$460
Prairie Buffer Seed Mix	\$975	Acre	1	\$975
Erosion Control Material	\$1.00	Square Yard	2600	\$2,600
Staples	\$42	Box	10	\$420
Geotextile Fabric	\$0.88	Square Yard	442	\$389
Construction Subtotal				\$16,467
	10% of construction			
Construction Contingency	subtotal			\$2,411
Construction Oversight	15% of total constructio	n services		\$2,832
Total				\$21,710



The opinion of the probable cost is \$25,199 for lowering the elevation of the existing pond, stabilizing the channels of the ravine, creating a swale from the emergency spillway, and slope stabilization at Site 5 (Table 8).

Table 8. Probable cost estimate for Site 5.

Item	Cost	Unit	Quantity	Total
Construction Services –				
Equipment and Labor	\$13,557	Each	1	\$13,557
Mobilization/Demobilization	\$2,500	Each	1	\$2,500
Erosion Control Material	\$1	Square Yard	560	\$560
Swale Channel ECM	\$1.40	Square Yard	100	\$140
Staples	\$42	Box	3	\$126
Swale Seed Mix	\$550	Acre	0.25	\$138
Slope Stabilization Seed				
Mix	\$275	Acre	1	\$275
Bare Root Trees and Shrubs	\$1.00	Each	240	\$240
Wood Stakes or Metal Posts	\$4.80	Each	240	\$1,152
Construction Subtotal				\$18,688
	10% of	f construction		
Construction Contingency	S	ubtotal		\$3,224
	15% of to	otal construction		
Construction Oversight	S	services		\$3,287
Total				\$25,199

4.1.4 Monitoring and Maintenance

A minimal amount of maintenance and monitoring will be required for the proposed projects. Inspections by Camp Logan staff will occur on an annual basis. During these inspections, staff will walk the top of the main ravines and any side ravines to make sure that a headcut is not occurring where water enters the ravine. Secondly, they will check the rock grade controls to make sure that the structures are intact and erosion is not occurring around them. Maintenance may be required on the grade controls if rocks get moved around during a significant storm event. Individuals will also monitor the amount of sediment accumulating behind each grade control. If sediment accumulates to the point that it is even with the top of the grade control, maintenance may be needed to remove the sediment and increase the sediment storage capacity. Thirdly, they will monitor wetland outlet pipes and the emergency spillways to make sure that overflows are not creating any significant erosion problems. The berm for the wetlands, especially near the spillways, should be kept free from muskrat holes and woody shrub and tree species. Annual burning or mowing is recommended to control woody plant species. An example for periodic maintenance is provided in Appendix D.

4.1.5 Permitting

No regulatory permits are required for the proposed projects because construction is not occurring in a "waters of the U.S."



4.1.6 Wetland Functional Assessment

There are no wetlands present at Sites 1 through 4. The detention pond present at Site 5 will not be impacted by construction machinery or the addition of any fill material.

4.1.7 Environmental Impact Assessment

There will be minimal environmental impact to the proposed projects. Trees will need to be removed to construct the wetlands and to allow for access to the different project sites along the ravines. Every attempt will be made to minimize the number of trees removed or disturbed at each site. Soil will be disturbed at landing sites for materials within the active project limits and along access paths from landing sites to project sites. During construction, the appropriate erosion control methods will be employed to prevent any direct or indirect negative impacts on the natural resources associated with the project boundaries. Disturbed areas will be returned to their pre-existing state.

4.1.8 Unusual Physical and Social Costs

Unusual physical and social costs associated with the proposed project are increased sedimentation behind the rock check dam structures, the loss of open turf grass field at Site 1-2 and row-crop land at Site 4 due to wetland creation, and the creation of temporary access paths during construction.

4.1.9 Land Owner Agreements

Limberlost Girl Scout Council is the only land owner for Sites 1 through 5. Written permission to construct the projects was given after the Limberlost Girl Scout Council and Camp Logan's Site Superintendent reviewed the proposed design set. The Site Superintendent provided significant feedback during the design phase on what types of projects would be feasible. A copy of the land owner agreement can be found in Appendix E.

4.2 Project Description – Site 6

4.2.1 Project Site at 1000 N.

Site 6 - Ravine 14 - County Road 1000 North

The proposed design pertains to the small ravine downstream of County Road 1000 North (Figure 23). The proposed design calls for the installation of a series of four rock grade controls in the channel of the drainage to reduce stormwater velocity and curtail erosion and sedimentation. The base and sides of the channel will be lined with the appropriate erosion fabric material and planted with a mixture of native plant species. The top of the channel banks will be planted with a mixture of bare-root and potted native tree and shrub species approximately ten feet on-center.





Figure 23. Looking downstream from County Road 1000 North at Site 7.

4.2.2 Project Design and Construction Specifics

Directly downstream from the culvert at County Road 1000 North, field stone (average diameter of six inches) will be installed to create a rock chute that will dissipate some of the water's energy as it enters the ravine. A minimum of six inches of excavation will occur prior to the rock being installed. A rock grade control will be installed on a 50 foot basis by excavating a key trench approximately two feet wide and one foot below the current grade across the channel and backfilling with field stone to an elevation one foot above current grade. Prior to rock installation, geotextile fabric will be laid down throughout the key trench. Between rock grade controls, turf reinforcement matting will be installed in the bottom of the channel. The sides of the channel will be re-graded as necessary to create a consistent surface for the application of erosion control materials. The side slopes will then be seeded with a custom slope stabilization seed mix and blanketed with NAG C-125BN or equivalent erosion control blanket. Along the top of the slopes, a mixture of potted and bare root native trees and shrubs on ten feet on-center will be planted. Construction specifics can be found in the plan set (Appendix B).



4.2.3 Cost Estimates

The opinion of the probable cost is \$8,648 for installing four rock grade controls, seeding and blanketing the channel and ravine side slopes for Site 6 (Table 8). An example of bid documents can be found in Appendix C to facilitate the implementation of this project.

Table 9. Probable cost estimate for Site 6.

Item	Cost	Unit	Quantity	Total
Construction Services –				
Equipment and Labor	\$1,891	Each	1	\$1,891
Mobilization/Demobilization	\$2,500	Each	1	\$2,500
Field Stone	\$72	Ton	8	\$576
Geotextile Fabric	\$0.88	Square Yard	25	\$22
Channel TRM	\$3.30	Square Yard	132	\$436
Erosion Control Material	\$1.00	Square Yard	264	\$264
Staples	\$42	Box	5	\$210
Slope Stabilization Mix	\$275	Acre	0.5	\$138
Potted Tree Stock	\$20	Each	40	\$800
Construction Subtotal				\$6,836
	10% of construction			
Construction Contingency	subtotal			\$684
Construction Oversight	15% of total construction		\$1,128	
Total				\$8,648

4.2.4 Monitoring and Maintenance

A minimal amount of monitoring and maintenance is required for this project. Members of the Dewart Lake Protective Association will inspect the rock chute and rock grade controls to ensure that erosion is not occurring around them. They will also make sure that vegetation becomes established on the slopes and that the erosion control material is not disturbed after construction. During the design phase of the project, several member of the DLPA mentioned that a large construction project was planned in the upstream portion of the ravine's watershed. DLPA members will need to be aware of any significant changes in watershed land use that might affect the proposed project. In other words, if a significant portion of the watershed is converted to impermeable surfaces such as roofs, stormwater velocity and discharge may increase, which may increase the likelihood that a large storm may negatively affect the treatment. An example for periodic maintenance is provided in Appendix D.

4.2.5 Permitting

No regulatory permits are required for the proposed projects because construction is not occurring in a "waters of the U.S."

4.2.6 Wetland Functional Assessment

There are no wetlands associated with Site 6.



4.2.7 Environmental Impact Assessment

There will be minimal environmental impact to the proposed project. The area adjacent to the proposed site consists of primary turf grass and residential landscaping.

4.2.8 Unusual Physical and Social Costs

There is a potential for unusual physical and social costs associated with this project site because of the proximity of residences. Care shall be taken by any contractor to prevent damage to a home or the surrounding landscape. Access to the site should take the path that will cause the least amount of damage to landscaping and turf grass. After the completion of the project, disturbed areas shall be returned to the pre-existing condition. One of the landowners (the Millers) has asked to be consulted prior to tree installation. The contractor shall work directly with both the Millers and the Buschs to outline and designated acceptable construction zones.

4.2.9 Land Owner Agreements

Steven and Melody Miller and Randolph and Tonja Busch own the property associated with the project on Ravine 14. Written permission to construct the project was given after the landowners' reviewed the proposed design set and a written project description with a member from the DLPA. The Miller's provided comments on how to access their property and requested to meet with them on the tree planting prior to the project. These requests shall be considered prior to and during the construction phase. A copy of the land owner agreement can be found in Appendix E.

4.3 Project Description – Site 7

4.3.1 Project Site at EMS D12 Lane

Site 7 - Ravine 15 - EMS D12 Lane

The proposed design pertains to the small ravine at the base of the hill north of EMS D12 Lane (Figure 24). The proposed design includes lining the eroding portion of the ravine with rip-rap to the current grade. Rip-rap will be added to a height of 2 feet along the portion or the ravine parallel with EMS D12 Lane. An eight-inch diameter vented riser will be tied into an existing culvert to provide stormwater storage. The result of this project will be to slow the velocity of stormwater and reduce erosion and sedimentation.





Figure 24. Eroding ravine at the base of a hill, north of EMS D12 Lane.

4.3.2 Project Design and Construction Specifics

The ravine will be stabilized by excavating the bottom of the channel and side slopes a minimum of six inches and backfilling with standard revetment rock back to the current grade. Extra care will be taken to blend stone into the current grade on the upper end of the channel so water flows into the channel and doesn't back up or flow around the stone. At the base of the ravine, a shallow sump area will be excavated to a depth of two feet below the existing grade. Along the portion of the ravine that parallels EMS D12 Lane, riprap will be installed to a height of two feet and keyed into the surrounding slopes. An eight-inch diameter vented riser will be installed in the center of the sump area and tied directly into an existing culvert. Disturbed areas will be seeded with a slope stabilization seed mix and blanketed with NAG C-125BN or equivalent erosion control material. The objective of this design is to prevent erosion at the head of this small ravine from continuing to move up the slope and to provide some temporary stormwater storage, which will allow for sediment to settle out of suspension. Construction specifics can be found in the plan set (Appendix B).

4.3.3 Cost Estimates

The opinion of the probable cost is \$14,079 for installing ravine stabilization, seeding and blanketing the channel and ravine side slopes; and installing the vented riser for Site 7 (Table 10). An example of bid documents can be found in Appendix C to facilitate the implementation of this project.



Table 10. Probable cost estimate for Site 7.

Item	Cost	Quantity	Total	
Construction Services –				
Equipment and Labor	\$4,814	Each	1	\$4,814
Mobilization/Demobilization	\$2,500	Each	1	\$2,500
Rip rap	\$30	Ton	111	\$3,330
Geotextile Fabric	\$0.88	Square Yard	222	\$195
Erosion Control Material	\$1	Square Yard	80	\$80
Staples	\$42	Box	1	\$42
Slope Stabilization Mix	\$275	Acre	0.25	\$69
8" vented riser and				
connectors	\$100	Each	1	\$100
Construction Subtotal			\$11,130	
Construction Contingency	10% of constru		\$1,113	
Construction Oversight	15% of total cons	es	\$1,836	
Total				\$14,079

4.3.4 Monitoring and Maintenance

A minimal amount of monitoring and maintenance is required for this project. Members of the Dewart Lake Protective Association will inspect the rock stabilization to make sure that erosion is not occurring. The vented riser should be keep free from trash and organic debris. An example for periodic maintenance is provided in Appendix D.

4.3.5 Permitting

No regulatory permits are required for the proposed projects because construction is not occurring in a "waters of the U.S."

4.3.6 Wetland Functional Assessment

There are no wetlands associated with Site 7.

4.3.7 Environmental Impact Assessment

There will be minimal environmental impact to the proposed project. Several trees will need to be removed during the construction phase. Every attempt should be made to minimize the number of trees removed and minimize the areas disturbed during construction.

4.3.8 Unusual Physical and Social Costs

There is a potential for unusual physical and social costs associated with this project site because of the proximity of residences. Care shall be taken by any contractor to prevent damage to a home or the surrounding landscape. After the completion of the project, disturbed areas shall be returned to the pre-existing condition.

4.3.9 Land Owner Agreements

The proposed site is owned by Marjorie and Martha Knotts and Brian and Doris Wall. Initial permission was obtained to investigate the site during the design phase. However, at this time the landowners are not interested in granting permission to construct the project (Appendix E).



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The DLPA will continue to stay in contact with the landowners in case their opinions on a water quality project change in the future.

4.4 Project Cost Evaluation

Each project cost was estimated as a stand alone project. An additional \$4,500 for permitting and \$4,000 for administrative services should be added to each project if the project is completed individually. Contractor mobilization/demobilization, permitting, and administrative services such a completing an as-built report would be reduced if one or more of the projects were completed as a package. For example if all the projects were completed under the same grant(s), the estimated total cost would be \$123,172. (See Table 11 for a complete breakdown.) The limited access to the ravines for equipment will be the most important factor in determining the overall cost of the project. Material will need to be stored from several landing locations and hauled to each individual project site. During the hauling, an access road will likely be created.

Table 11. Cost breakdown if projects were completed under the same funding cycle.

Task	Total
Construction Services and Materials	\$88,654
Mobilization	\$5,000
Administrative Services	\$4,000
Contingency (10% of Construction Services)	\$8,865
Construction Oversight (15% of Construction Services)	\$16,653
Total	\$123,172

5.0 PROJECT SUMMARY

Fifteen ravines along the northern shore of Dewart Lake were surveyed in February 2006 to assess whether erosion and sedimentation problems existed and if any feasible solutions were available. From the initial survey, seven ravines were selected for design because significant erosion problems were present. Reducing the erosion and sedimentation at these sites would positively impact the water quality of Dewart Lake.

Five of the seven projects were located on the Camp Ella J. Logan Girl Scout property with the remaining two projects being located near the northwest corner of the lake, south of County Road 1000 North. Projects ranged from the installation of a couple of rock grade controls and rock channel stabilization within one ravine to wetland creation at the top of another eroding ravine. Project costs also varied from \$8,033 to \$32,475 and were reflected in the amount of work being performed at a site and the obstacles to construction that will need to be overcome. The overall project cost was estimated at \$123,172, which includes acquiring the necessary permits for all the proposed projects, contractor mobilization fees, and administrative services. If projects are done on an individual basis or as numerous smaller groups of projects overall project will increase.

It is recommended that the DLPA pursue construction grants from the LARE program and the Great Lake Commission (GLC) Sediment Control program to implement the proposed projects in the fall of 2007 through 2008. The DLPA should leverage grant money from the LARE



program as match towards the GLC grant. The DLPA should also consider providing in-kind match through the use of volunteer time and donated materials.

6.0 <u>LITERATURE CITED</u>

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#JFNew

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Appendix A.

Design Data and Engineering Calculations

Site 1 Check Dam Calculations

Notes:

- All stone D50 = 5"
- 50 year storm event 5.0' rainfall in 24 hours
- CFS = 16
- -Maximum velocity = 6.4 fps
- -See Runoff "Curve Number" and "Time of Concentration and Peak Discharge" worksheets for additional calculations

Table 1. Summary of Check Dam Dimensions for Site 1-1a through 1-5

Description	Site 1-1a	Site 1-1b	Site 1-3	Site 1-4	Site 1-5
Entrance Slope	3:1	3:1	3:1	3:1	3:1
Exit Slope	5:1	5:1	5:1	5:1	5:1
Controlled Drop	4.0'	3.5'	5.0'	8.0'	4.0'
Chute Length	20'	11'	25'	40'	20'
Chute Apron	5'	4'	5'	5'	5'
Bottom Width	6'	4'	6'	6'	6'
Depth Flow in	0.5' + 1.0'	0.5' + 0.5	0.5' + 1.0'	0.5' + 1.0'	0.5' + 1.0
Chute	freeboard	freeboard	freeboard	freeboard	freeboard
	(1.5')	(1.0')	(1.5')	(1.5')	(1.5')
Depth Flow in	1.5'	1.5'	2.0'	2.0'	2.0'
Entrance	1.5	1.3	2.0	2.0	2.0
Total Width	17'	12'	25'	17'	14'
Total Length	34'	23'	45'	54'	37'
Capacity	24 cfs	N/A	24 cfs	24 cfs	24 cfs
Velocity	6.5 fps	N/A	6.5 fps	6.5 fps	6.5 fps
Top width	2-3'	2-3'	2-3'	2-3'	2-3'
Side Slope	4:1	3:1	2.5:1	2.5:1	2:1

WORKSHEET IN-1: RUNOFF CURVE NUMBER (CN)

lient Camp Logan		P	ractic	e and	ID Ro	ch check t	Zams -Site
/ V	County	Soil	and Wa	ter Co	nserva	tion Distr	ict, Indian
y Date	· c	hecked	by			Date	
COVER TREATMENT 1/ TYPE	CURVE NUMBER (CN) HYDROLOGIC CONDITION Hydrolocic Soil Group 2/ (EFM Table IN-2-2) A B C D				AREA, ACRES	PRODUCT OF CN X ACRES	
Row Crops - Straight Row	poor good	72 67	81 78	88 85	91 89		
- Straight Row + CR	poor good	71 64	80 75	87 82	90 85	1	
- Contoured + CR	poor good	69 64	78 74	83 81	87 85		
Small Grain - Straight Row - Straight Row + CR	poor good	65 63	76 75	84 83	88 87		
Pasture or Grassland	poor good	68	79	86 74	89 80		
Meadow - Not Grazed		30	58	7	78	10,1	585,80
Woods	poor good	45 30	66	77	83 77		
Farmsteads		59	74	82	86		
Streets and - Paved w/ Curb Roads - Paved w/ Ditches		98	98	98	98 93	,	
Residential - 1/4 acre lots <u>3</u> / - 1/2 acre lots 1 acre lots		61 54 51	75 70 68	83 80 79	87 85 84	ia.	
Other (Specify)							
1/ Crop residue cover (CR) applies if residue is on at least 5% of the surface throughout the year. 2/ See EFM Table 2-3 for definitions.					 ALS	11.0	651.83
3/ Includes subdivision str ====================================	45%	=====	=====	 ===== ; Use		1	
Total Acres (Do not use less than CN	60 without a	pprova	lofa	rea en			=======================================

WORKSHEET IN-2: TIME OF CONCENTRATION AND PEAK DISCHARGE

Clier	nt Camp Logan Practice	and ID Roc	h Check Dan	15 - Site #
	County Soil and	Water Conser	vation Distr	ict, Indiana
Ву	Date Checked by		Date	
Estin	nating Time of Concentration			
1.	Data:			
	Rainfall Distribution Type	• • • • • • • • • •	= <u>I</u>	1
	Drainage Area (IN-ENG-10)		A =//,	D acres
	Runoff Curve Number (IN-ENG-10)		. CN = _60	>
	Watershed Slope		Y = _ <i>S</i> , 5	5 Ave 1
	Flow Length		1 = 750	feet (
2.	T using l, Y, CN and EFM Figure 2-27 (page 2-41)			
	or using EFM Equation 2-5:		*	
	$T_{c} = \frac{10.8(1000/\text{CN} - 9)^{0.7}}{1140 \text{ y}^{0.5}} = \frac{()^{0.8}()^{0.8}()^{0.7}}{1140 \text{ y}^{0.5}}$			
	c 1140 Y 0.5 1140 () 0.5		· Tc =	hours
Fetin	mating Peak Discharge:	*******		=========
LOCIN	acting reak bischaige.	Storm #1	Storm #2	Storm #3
1.	Frequency yea	r 25	50	100
2.	Rainfall, 24-hour, inches (Figure IN-2-1) P	= 4.5	5.0	5,4
3.	Initial Abstraction	- 1,333	1.333	1.333
4.	Compute I _a /P ratios I _a /P	- 0/		0.247
5.	Unit Peak Discharge, cfs/acre/inch	1.04	1.065	1.08
6.	Runoff, inches	1.02	1.30	1,55
A. T. C.	Ponding and Swampy Area Adjustment Factor Fp (Use percentage of area and EFM Table IN-2-1)	-75	175	
8.	Peak Discharge, cfs	= 11.7	15.2	18,4
=====				

East Wetland Calculations and Support Data

Soils – Miami/Riddles "B" –Based on going to CRP and with existing grass areas. Curve Number – 61

Runoff 10 yr - 3.9" - 24 hr, 0.76" 25 yr - 4.5" - 24 hr, 1.02"

Total Runoff Volume -3.5 acres x 43,560 ft = 152,460 sqft X 0.06' (depth of runoff 0.76/12) = 9150 cu ft in 24 hours

Designed Storage -0.15 acres X 1 ft = 0.15 ac/ft = 6534 cu. Ft

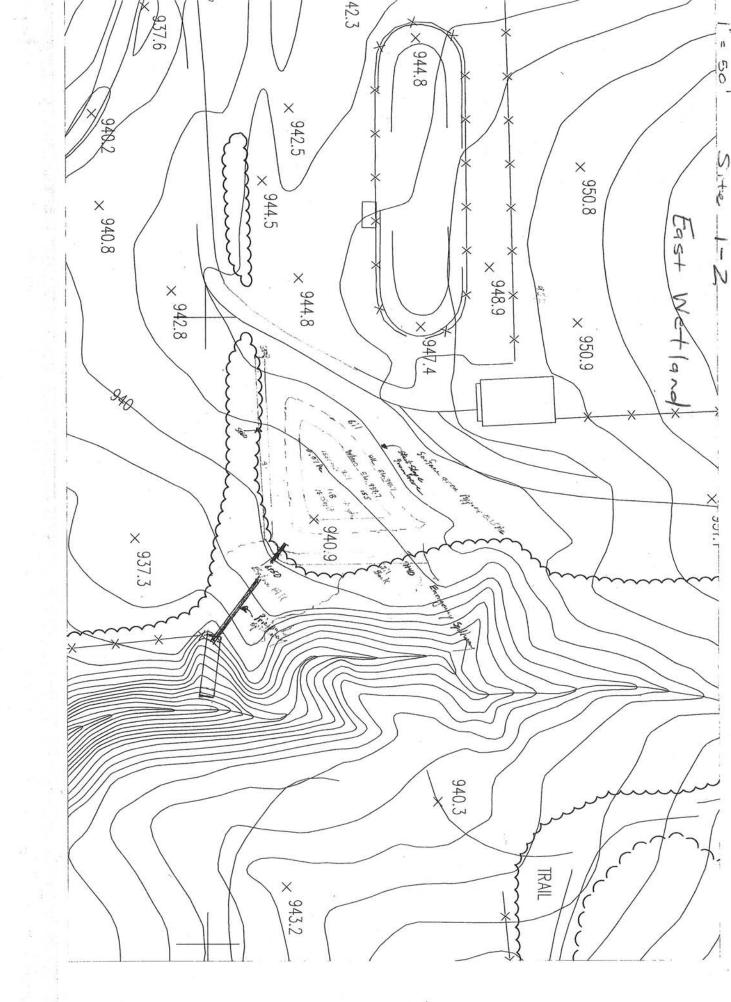
Pipe Discharge in 24 hours

8" PVC (Roughness coefficient = 0.016) 10' head (Elevation at emergency spillway = 942.7', elevation at outlet = 932.7') Cfs = 2.78 in 100 l.f. pipe

Designer Note:

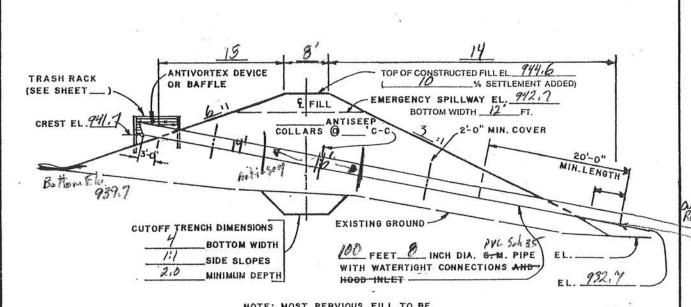
Principal spillway is not normally installed where drainage area is less than 10 acres. It is anticipated that the emergency spillway would seldom be used with the 8" pipe. It is okay since emergency spillway area is not the most stable area. The design is a cross between wetland, pond, and a stabilization structure. Some parts of the design are based on experience.

Wayne Stanger (edited by Mark Pranckus)



** scale is not accurate w/ drawing at this size. Has been reduced 63% from ロメング original

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NOTE: MOST PERVIOUS FILL TO BE PLACED IN DOWNSTREAM 1/3 OF DAM.

NOTE: THIS TYPE CONDUIT OUTLET IS LIMITED TO CONDUITS OF 15 INCHES OR LESS WITH THE OUTLET INVERT ONE TO TWO FEET ABOVE A STABLE CHANNEL BOTTOM. FOR CONDUITS OVER 15 INCHES, USE OUTLET PIPE SUPPORT.

NOT TO SCALE PROFILE ALONG CENTERLINE PRINCIPAL SPILLWAY

ESTIMATE OF MATERIALS	SOILS IN	VESTIG	ATION REPORT
<u>ITEM</u> QUANTITY	LOCATION OF BORINGS	DEPTH FEET	UNIFIED SOIL CLASSIFICATION
Clearing — — — — — — O.I Acres	OF BONTINGS	1221	CEACCITICATION
Excavation	<u> </u>		
Earth fill, compacted 485 Cu.yd.			
Pipe, 6 Inch diameter PVL 5ch 35 Water find connections Bar Guard			=
Bar Guard 75 Cuyds			
Core Trench Execusions			
Antivortex device or baffle — Each		 	
Pipe support (See Sheet) — Each			
Trash rack and protective fence Each			
Antiseep collar Butth Rubber Each			
Stockwater system (See Sheet) Each	ENADANIZATE	ENIT DO	OND OR DIRE
Seeding and mulching 0.25 Acres			
Fencing = Feet			H HOOD INLE
1. S.	The second secon		
	U. S. DEPAR' SOIL CON	TMENT O ISERVAT	F AGRICULTURE TON SERVICE
=	Designed	Date Ap	proved by
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E. 1.05 U. 3	Reviewed		
Stockwater system (See Sheet Each Seeding and mulching Acres	STRUCTUR NAME Camp D U. S. DEPAR' SOIL CON Designed Drawn Checker	E WIT	proved by

East Wetland W = Ft. W/2 W/2 Continous 1/8" fillet weld all around pipe Angle varies with pipe diameter W/2 ij 7/16" diam. holes @ max. spacing 6" O.C. O.D. of pipe plus 1 5/8" **Bolt Circle** Notes: 1. Hot rolled sheet steel 16 ga. or aluminum sheet — min. thickness 0.06".

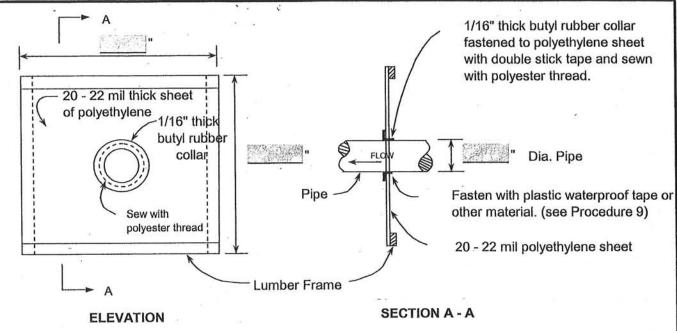
2. Install C.M. antiseep collar with corrugations vertical. ALTERNATE DETAILS OF ANTISEEP COLLAR & fill & fill I st collar-| st collar 14' max. Length of pipe "L" 14 max! Length of pipe "L"

PIPE	MAXIUM SI	PACING					LF	ENGTH	1 OF	OF PIPE "L" IN FEET								
SIZE INCHES	FEE	Т	5	0	E	60		70	8	0	9	0	10	00	1	10		120
INCITED	SIZE COLLAR	R "W" FEET		SIZE COLLAR "W" FT.														
	4X4	5X5	4X4	5X5	4X4	5X5	4X4	5X5	4X4	5X5	4X4	5X5	4X4	5X5	4X4	5X5	4X4	5X5
6&8	20	25	2	2	2	2	2	2	3	3	3	3	4	3	4	4	4	4
10&12	20	25	2	2	2	2	3	2	3	3	4	3	4	4	4	4	5	4
15	19	25	2	2	3	2	3	2	4	3	4	3	5	4	5	4	6	4
18	18	25	2	2	3	2	3	2	4	3	4	3	5	4	5	4	6	4
21	15	23	2	2	3	2	4	3	4	3	5	4	5	4	6	4	7	5
24	14	21	3	.2	3	2	4	3	5	3	5	4	6	4	7	5	7	5
30		18	1-	2	_	3		3	-	4	_	4		5	-	5	-	6

NUMBER OF REQUIRED ANTISEEP COLLARS & spacing for 6" THRU 30" DIAMETER PIPE

	BILL OF MATERIALS	ANTISEEP COLLARS AND COUPLING DEVICES FOR 6" THROU 30" C.M.					
QUANTITY	DESCRIPTION						
	Antiseep collarft. orft. round or square	PIPE					
	Flange coupling	NAME Camp Logan					
	Hex. HD. nuts, 3/8" x 1"	U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE					
	Hex. HD.·nuts, 3/8"	Date					
	Flat washers - cut steel, 7/16" I.D. x 7/8" O.D.	Designed	Approved by				
	Watertight coupling band, w/lug rods	Checked	Sheet Drawing No.				
		Reviewed	No Of				

East Wetland

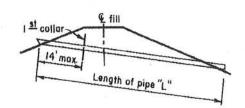


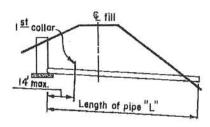
CONSTRUCTION PROCEDURE:

- 1. Cut polyethylene sheet to required dimensions shown for anti-seep collar.
- 2. Cut a hole in center of polyethylene sheet to OD of pipe.
- 3. Cut butyl rubber collar 8" larger than OD of pipe.
- 4. Cut hole in center of butyl collar 3" smaller than OD of pipe.
- 5. Fasten butyl rubber collar to polyethylene sheet with double-stick tape so that holes are concentric and sew together with polyester thread through tape.
- 6. Place mastic or roofing cement at location on pipe for anti-seep collar.
- 7. Force butyl rubber collar and polyethylene sheet over upstream end of pipe, move to location where mastic or roofing cement is applied, and position anti-seep collar in place.
- 8. Fasten to frame as shown, with staples or roofing nails, or use other methods to hold anti-seep collar in place during placement of compacted backfill.
- 9. Fasten butyl collar to pipe with plastic waterproof tape, stainless steel band, nylon rope or other similar material.
- Apply mastic or roofing cement over threads and fastening to insure that installation is watertight.

NOTE:

Can use heavy duty polyethylene sheets for anti-seep in lieu of the above alternative.





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Natural Res United Stat			

DRAWING NO. IN-ENG-30.XLS (REV. 10/03)

DI	ETAILS OF POLYETHYLENE
	ANTI-SEEP COLLAR
Landuser	Allegan in the Company of the Company
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Site 2 Check Dam Calculations

Notes:

- All stone D50 = 5"
- 50 year storm event 5.0' rainfall in 24 hours
- CFS = 16
- -Maximum velocity = 6.4 fps -See Runoff "Curve Number" and "Time of Concentration and Peak Discharge" worksheets for additional calculations

Table 2. Summary of Check Dam Dimensions for Cross Sections 2-1 and 2-2

Description	Cross Section 2-1	Cross Section 2-2
Entrance Slope	3:1	3:1
Exit Slope	5:1	5:1
Controlled Drop	5.5'	2.0'
Chute Length	27'	10'
Chute Apron	5'	5'
Bottom Width	4'	4'
Depth Flow in	0.5' + 1.0'	0.5' + 1.0'
Chute	freeboard (1.5')	freeboard (1.5')
Depth Flow in	2.0'	2.0'
Entrance	2.0	2.0
Total Width	12'	16'
Total Length	37'	21'
Capacity	16 cfs	17 cfs
Velocity	6.4 fps	6.2 fps
Top width	2-3'	2-3'
Side Slope	2.5:1	3:1

WORKSHEET IN-1: RUNOFF CURVE NUMBER (CN)

Client _	Camp Logan		F	ractio	e and	ID Ro	ch Chech I	Pans -Site+
		County	/ Soil	and Wa	iter Co	nserva	ation Distr	ict, Indiana
Ву	Date		Checked	d by _			Date	
COVER TYPE	TREATMENT 1/	HYDROLOGIC CONDITION 2/	Hydro	RVE NUN olocic FM Tabl	Soil (Group	AREA, ACRES	PRODUCT OF CN X ACRES
	ops - Straight Row	poor good	72 67	81 78	88 85	91 89		
	- Straight Row + CR	poor good	71 64	80 75	87 82	90 85	i.	
	- Contoured + CR	poor good	69 64	78 74	83	87 85		
Small	Grain - Straight Row - Straight Row + CR	poor good	65 63	76 75	84 83	88 87		
Pastur Grassl		poor good	68	79	86	89 80		
Meadow	- Not Grazed	Mr. B	30	58	71	78	2.3	133.4
Woods	RXV	poor good	45 30	66 55	77 70	83 77	13	71.5
Farmst	eads		59	74	82	86		
	s and - Paved w/ Curb - Paved w/ Ditches		98 83	98 89	98 92	98 93	1.2	106.8
Reside	ential - 1/4 acre lots - 1/2 acre lots - 1 acre lots		61 54 51	75 70 68	83 80 79	87 85 84	s	
Other	(Specify)							
2/ See 3/ Inc	op residue cover (CR) a least 5% of the surface EFM Table 2-3 for de- cludes subdivision stre	ce throughout finitions. eets and driv	the y	ear.	TOT		H,8	311.7
Weight	Product Total ed CN = Total Acres not use less than CN	=	3		; Use	CN = _	65	

* Payhouse A

WORKSHEET IN-2: TIME OF CONCENTRATION AND PEAK DISCHARGE

Clie	nt Camp Logan Practice a	nd ID Rack	Check Br	s -Site #2
	County Soil and Wa	ter Conserv	ation Distr	ict, Indiana
ВУ_	Date Checked by		Date	
Esti	mating Time of Concentration			322222222
1.	Data:			
	Rainfall Distribution Type		= <u>I</u>	<u> </u>
	Drainage Area (IN-ENG-10)		. A = <u>4</u> .	8 acres
	Runoff Curve Number (IN-ENG-10)		CN =	2
	Watershed Slope		. Y =	0_ %
	Flow Length		. l = _ 80	O feet
2.	T _c using l, Y, CN and EFM Figure 2-27 (page 2-41)		Tc = 0,22	hours
	or using EFM Equation 2-5:		181	
	$T_c = \frac{10.8(1000/\text{CN} - 9)^{0.7}}{1140 \text{ y}^{0.5}} = \frac{()^{0.8}()^{0.7}}{1140 \text{ ()}^{0.5}}$		T _c =	hours
Ectio	mating Dook Dischange.		========	
ESLII	mating Peak Discharge:	Storm #1	Storm #2	Storm #3
1.	Frequency year	25	50	100
2.	Rainfall, 24-hour, inches (Figure IN-2-1) $P =$	4.5	5.0	5,4
3.	Initial Abstraction	0.857		0.857
4.	Compute I_a/P ratios $I_a/P =$	0.190	0.171	0.159
5.	Unit Peak Discharge, cfs/acre/inch	1.12	1.14	1,15
6.	Runoff, inches Q = (Use P and CN with EFM Figure 2-26 or Table 2-2)	1,67	2.04	2,35
7.	Ponding and Swampy Area Adjustment Factor F = (Use percentage of area and EFM Table IN-2-1)			
8.	Peak Discharge, cfs $q_p = (Where q_p = q_u^{AQF}_p)$	9,0	11.2	13

Site 3 Check Dam Calculations

Notes:

- All stone D50 = 7"
- 50 year storm event 5.0' rainfall in 24 hours -See Runoff "Curve Number" and "Time of Concentration and Peak Discharge" worksheets for additional calculations
- -Percent slope of watershed = 6%

Table 3. Soil and Sub-watershed Information

Land use	Soil Unit	Acreage	Hydric Class
CRP	BoC	1.5	В
CRP	RxB	1.0	В
CRP	CrA	5.0	C
Woods	RxC	7.0	В
Crop + CRP	MgB	18.5	В
Cropland	RIB	2.0	В

Table 4. Summary of Check Dam Dimensions for Site 3

Description	Site 3
Entrance Slope	3:1
Exit Slope	5:1
Controlled Drop	
Chute Length	25'
Chute Apron	5'
Bottom Width	10'
Depth Flow in Chute	1.6
Depth Flow in Entrance	2.0
Total Width	12'
Total Length	37'
Capacity	
Velocity	
Top width	2-3'
Side Slope	2:1

WORKSHEET IN-1: RUNOFF CURVE NUMBER (CN)

Client Camp Logan		P	ractio	e and	ID Sil	e#3 Ruch	Check Dans
	County	Soil	and Wa	ter Co	nserva	ntion Distr	ict, Indian
By Date	· c	hecked	d by			Date	
COVER TREATMENT 1/	HYDROLOGIC CONDITION 2/	CONDITION Hydrolocic Soil Group				AREA, ACRES	PRODUCT OF CN X ACRES
Row Crops - Straight Row	poor good	72 67	81 78	88 85	91 89		
- Straight Row + CR	poor good	71 64	80 75	87 82	90 85	2.1ac	150
- Contoured + CR	poor good	69 64	78 74	83 81	87 85		
Small Grain - Straight Row - Straight Row + CR	poor good	65 63	76 75	84 83	88 87		
Pasture or Grassland	poor good	68	79 61	86 (4)	89 80	≥5.0ar 2/ac:	370 1281
Meadow - Not Grazed		30	58	71	78		
Woods	poor good	45 30	55	77 70	83 77	7m	462
Farmsteads		59	74	82	86		
Streets and - Paved w/ Curb Roads - Paved w/ Ditches		98	98	98 92	98 93		
Residential - 1/4 acre lots 3/ - 1/2 acre lots - 1 acre lots		61 54 51	75 70 68	83 80 79	87 85 84		
Other (Specify)							
1/ Crop residue cover (CR) at least 5% of the surface 2/ See EFM Table 2-3 for decay 13/ Includes subdivision stre	ce throughout finitions.	the y		 тот, 		35 ACRES	2263
Product Total Weighted CN = Total Acres (Do not use less than CN	= 226	3		; Use	CN = _	======= 64:7	

WORKSHEET IN-2: TIME OF CONCENTRATION AND PEAK DISCHARGE

Clie	nt Camp Logan Pre	actice a	nd ID Roch	Check Vam	5 - Site =
D					ict, Indiana
By _	Date Checked b	:====== oy		Date	
Esti	mating Time of Concentration				
1.	Data:				
	Rainfall Distribution Type			=1	<u> </u>
	Drainage Area (IN-ENG-10)			. A = <u>35</u>	acres
	Runoff Curve Number (IN-ENG-10)			CN =65	
	Watershed Slope			. Y = <u>6</u>	%
	Flow Length	•••••	• • • • • • • • • • •	. l = <u>120</u>	O feet
2.	T _C using l, Y, CN and EFM Figure 2-27 (page 2-4	1)		T _c = _0.4	3 hours
	or using EFM Equation 2-5:			₹6	
	$T_c = \frac{10.8(1000/\text{CN} - 9)^{0.7}}{1140 \text{ y}^{0.5}}$ ()0.8() ^{0.7}		T -	Lance
	1140 y ^{0.5} 1140 () ^{0.5}		*********	'c	nours
Esti	mating Peak Discharge:				
			Storm #1	Storm #2	Storm #3
1.	Frequency	. year	25	50	100
2.	Rainfall, 24-hour, inches (Figure IN-2-1)	P =	4.5	5,0	5.4
3.	Rainfall, 24-hour, inches (Figure IN-2-1) Initial Abstraction	. I _a =	1.077	1,077	1,077
4.	Compute I _a /P ratios	I _a /P =	,239	, 215	.199
5.	Unit Peak Discharge, cfs/acre/inch		0.79	0.80	0.81
6.	Runoff, inches	Q =	1,33	1,65	1.93
7.	Ponding and Swampy Area Adjustment Factor (Use percentage of area and EFM Table IN-2-1)				
8.	Peak Discharge, cfs	. q _p =	36.8	46,2	54.7
	(II) I				

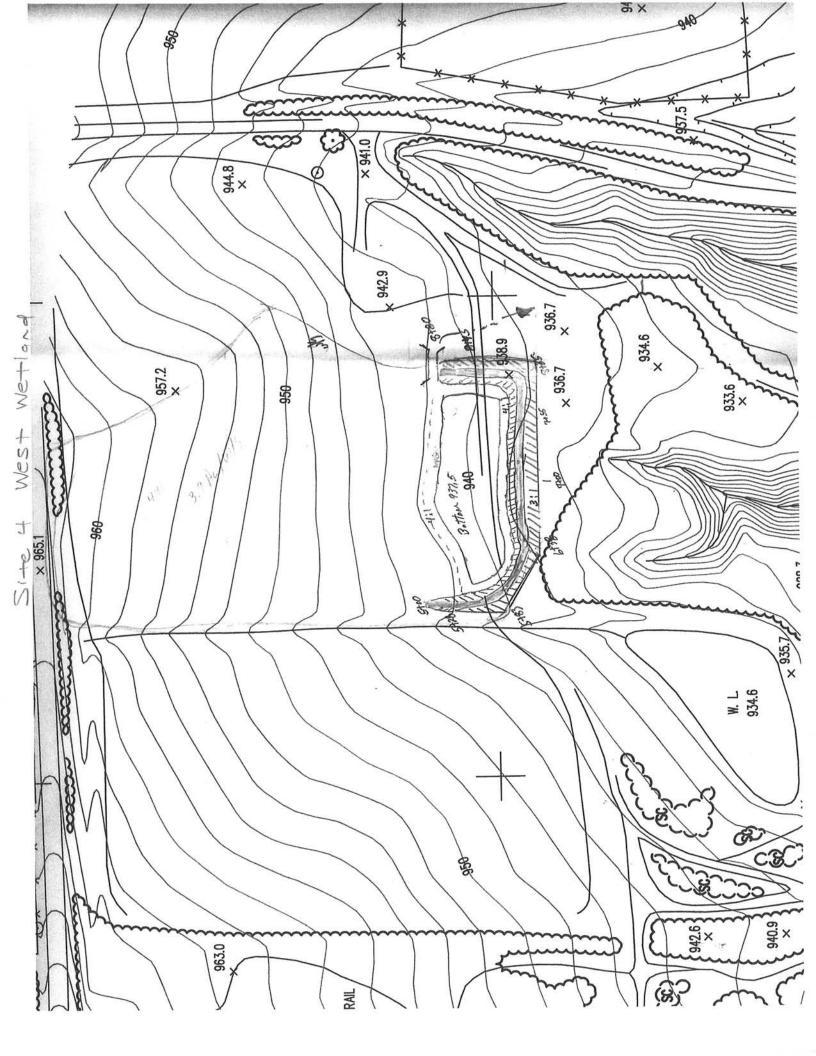
West Wetland Calculations and Support Data

Soils – Miami/Riddles "B" –Based on going to CRP and with existing grass areas. Curve Number – 61

Total Runoff Volume -3.9 acres x 43,560 ft = 169,884 sq ft X 0.06' (depth of runoff 0.76/12) = 10,193 cu ft in 24 hours

- 169,884 sq ft x 0.085 = **14,440 cu ft runoff in 24 hours**
- $86,400 \sec/24 \text{ hr} = 0.118 \text{ cfs/sec from } 10 \text{ yr storm}$
- $3.9 \text{ acres } \times 0.06 \text{ (runoff in 24 hrs)} = 0.234 \text{ acre-ft runoff in 24 hours}$

Designed Storage -0.40 acres (79' X 222') X 1 ft = 0.40 ac/ft = 17538 cu. Ft



		Legend ravi
		and ravine6_pond_surve
		nd_surve
	107.9 108.7 105.8 104.1 104.3 101.8 102.8 99.5 100.7 99	
	108.7 108 106 106 102.8 101. 100.7 99.7 99.7	
	7 108.4 108.3 ₁₀₈ 106.1 105.7 106 6 103.8 103.4103.7 3 103.8 101.5101.6 8 101.5 101.5101.6 99.7 98.2 98.1 97.4 95.8 96.1	mest me
	108.4 108.3 _{108.1} 107.9 108 108.2 106.1 105.7 106 105.3 105.6 100.1 103.4103.7 103.1 104.7 103.8 103.4103.7 103.1 104.7 101.5 101.5101.6 100.9 101.1 99.7 98.9 99.1 100.2 9 98.2 98.1 98.5 98.8 98.3 97.4 97.6 98.8 98.3 95.8 97 96.1 95.696.2 98.1 97.9	
	108 108.2 105.6 4.7 104.7 101.1 100.2 98.8 98.3 98.1 98.1 98.1	
	98.7	
	104.1 104.3 103.5 103.5 100.7 99.2	
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-			5	Site 4	Wes	st w	etland				
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Ę	Bottom North S	190 'X	50 X 2	2,25 ±	th = 880 345 eugds	and the second second	Flooded Acres	verage Acres	Interval Ft.	Interval Storage Ac Ft	Accum Storage Ac. Ft.
	ore Tres	1 eth 35	z'x 4'x	2 = 10	5e uyds						
STAGE	3.5	to Surfi Actions 911 Mati	600 sq Ho	0,38 AL							
	TEMP)RARVS	TORAGE	(AG, FT.)		STAG	E-STO	RAGE	CURV	E DATA	
4:1 From	t E	RTHW	ORK CO	MPUTATI	ONS	The state of the s	Trippe Manesaugamaya	AND COLUMNS		NAME OF TAXABLE	-1000
3:1 Book	illian desi	teli Luigiu Eli	entyas par ft.	Averaga fill ou.yd,	Distance ().	FIII cu.yd.	CONSTRUCTION CHEC				
5100	943.0	0	0	0.28	28	8	Top v	vidth			ft.
5128	942.0	1.0	0.56	1.33	55	73	Side st				1
5+83	940,0	3.0	2.09	3.35	55	184			prin.)		in. ft.
7+00	937.5	5.5	5,40	5.0	62	310	1		erg. el. = _		ft.
strength to the same of	938.0	5.0	4,60	5.0	55	275			idth		
	939.0		3,3	3.95	. 50	197	- 1				
April Control	940.0		2.09	2.70	40	108	1		el		
	941.5		0.67	1.38	35	48	Prin. sp				
er stand for						1203	Prin. sp	lwy. ot			
							ļi	nvert e	91	***************************************	
Clearing	arlaqual	a (vas) (r	10)	2004 + 10 - 8240 	Gore t		quate (ye	es) (no) <u>.</u>			
Stockwa	lor syste	in adaqui	ate (yes)	(no)	Fenci	ng adequ	ate (yes)	(no)			
Seatting	adanua!	a (yas) (r	10)	Harran Sala	Pipe I	nstallatio	n adequa	ite (yes	s) (no)		
Loarity 378) and Charles	the object	jah meet a as desi	s all the s gned.	equirement		a Standar Date			ations fo	r Pond (Code
NOTIFICATION OF		Arthur Hankelto						USBARIUS DE PA	e i salanda angleso a		

	160 2	AND MARK OF STREET SAN THE
		ANTAC CESTANTED
	Plus 3 10 8	19
TRASH RACK (SEE SHEET).	ANTIVORTEX DEVICE OR BAFFLE	TOP OF CONSTRUCTED FILL EL. 943.5
**************************************	E FILL	BOTTOM WIDTH 12 FT.
CREST EL. 940.5	COLLARS	NTISEEP 2'-0" MIN. COVER
	Anti-kep	MIN.LEHGTH
· Bottom Elv. 87.5		
	CUTOFF TRENCH DIMENSIONS	EXISTING GROUND
	BOTTOM WIDTH	40 FEET B INCH DIA. C.M. PIPE EL. Peter migrefy
	. 2 MINIMUM DEPTH	HOOD INLET EL.
	NOOT DE	DUIGUE FULL TO BE

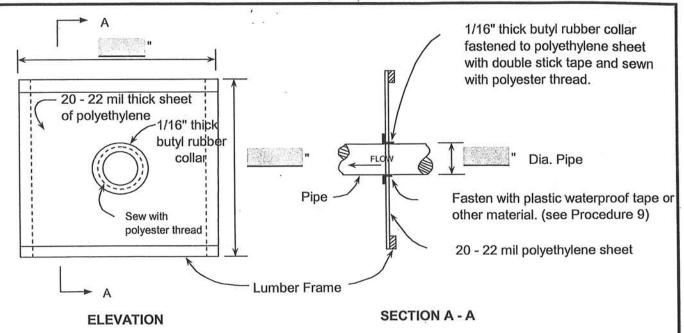
NOTE: MOST PERVIOUS FILL TO BE PLACED IN DOWNSTREAM 1/3 OF DAM.

INDIANA NACS

NOTE: THIS TYPE CONDUIT OUTLET IS LIMITED TO CONDUITS OF 15 INCHES OR LESS WITH THE OUTLET INVERT ONE TO TWO FEET ABOVE A STABLE CHANNEL BOTTOM. FOR CONDUITS OVER 15 INCHES, USE OUTLET PIPE SUPPORT.

NOT TO SCALE PROFILE ALONG CENTERLINE PRINCIPAL SPILLWAY

ESTIMATE OF MATERIALS		ŞOILS IN'	VESTIG	ATION REPORT
ITEM Q	UANTITY	LOCATION	DEPTH	UNIFIED SOIL
Clearing	Acres	OF BORINGS	FEET	CLASSIFICATION
Excavation	Cu.yd.			
Earth fill, compacted 1203	_Cu.yd.			
Pipe, 8 inch diameter PVC Sch 35 40	78x.			
Core Trench Excavation 105 engls	1:- 21			
	Lin.ft.			
Antivortex device or baffle —	Each			
Pipe support (See Sheet)	Each		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
Trash rack and protective fence	Each			
Antiseep collar - 4x4 ft Labor - 1	Each		7	
Stockwater system (See Sheet)	Each	EMBANKME	INT D	OND OR PIPE
Seeding and mulching <u>0.25</u>	Acres			
Fencing	Feet	/	Logan	H HOOD INLET
3 004		IN MILE		A COLOUR WIDE
v		SOIL CO	TMENT C	F AGRICULTURE TON SERVICE
¹⁰			Date A	proved by
		Designed	m	le
		Grawn	-	eet Drawing No.
Ψ _ω , **		Checker	Ne	
		Reviewed		Tuo et 400 Deu 6.91



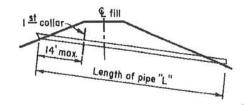
CONSTRUCTION PROCEDURE:

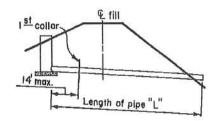
- 1. Cut polyethylene sheet to required dimensions shown for anti-seep collar.
- 2. Cut a hole in center of polyethylene sheet to OD of pipe.
- 3. Cut butyl rubber collar 8" larger than OD of pipe.
- 4. Cut hole in center of butyl collar 3" smaller than OD of pipe.
- 5. Fasten butyl rubber collar to polyethylene sheet with double-stick tape so that holes are concentric and sew together with polyester thread through tape.
- 6. Place mastic or roofing cement at location on pipe for anti-seep collar.
- 7. Force butyl rubber collar and polyethylene sheet over upstream end of pipe, move to location where mastic or roofing cement is applied, and position anti-seep collar in place.
- 8. Fasten to frame as shown, with staples or roofing nails, or use other methods to hold anti-seep collar in place during placement of compacted backfill.
- Fasten butyl collar to pipe with plastic waterproof tape, stainless steel band, nylon rope or other similar material.
- 10. Apply mastic or roofing cement over threads and fastening to insure that installation is watertight.

NOTE:

Can use heavy duty polyethylene sheets for anti-seep in lieu of the above alternative.

Section







DE	TAILS OF POLYETHYLENE ANTI-SEEP COLLAR
anduser	A
Location	
	County SWCD, INDIANA

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DRAWING NO. IN-ENG-30.XLS (REV. 10/03)

Appendix B.

Plan Set



Corporate/Northern Indiana 708 Roosevelt Road Walkerton, Indiana 46574 574-588-3400 fax 574-588-3448

Central Indiana 6640 Parkdale Place, Suite S Indianapolis, Indiana 46254 317-388-1982 fax 317-388-1986 Ohlo 11156 Luschek Drive Cincinnati, Ohio 45241 513-489-2402 fax 513-489-240

Eastern Michigan 605 S. Main Street, Suite 1 Ann Arbor, MI 48104 734-222-9690 fax 734-222-9655

Western Michigan 11181 Marwill Avenue West Olive, Michigan 49460 608-240-1453 fey 618-847-9970

Illinois 6805 Steger Road, Unit A Monee, Illinois 60449 04 708-534-3450 fax 708-534-

> Wisconsin 1402 Pankratz Street, Suite 302 Madison, Wisconsin 53704

302 04

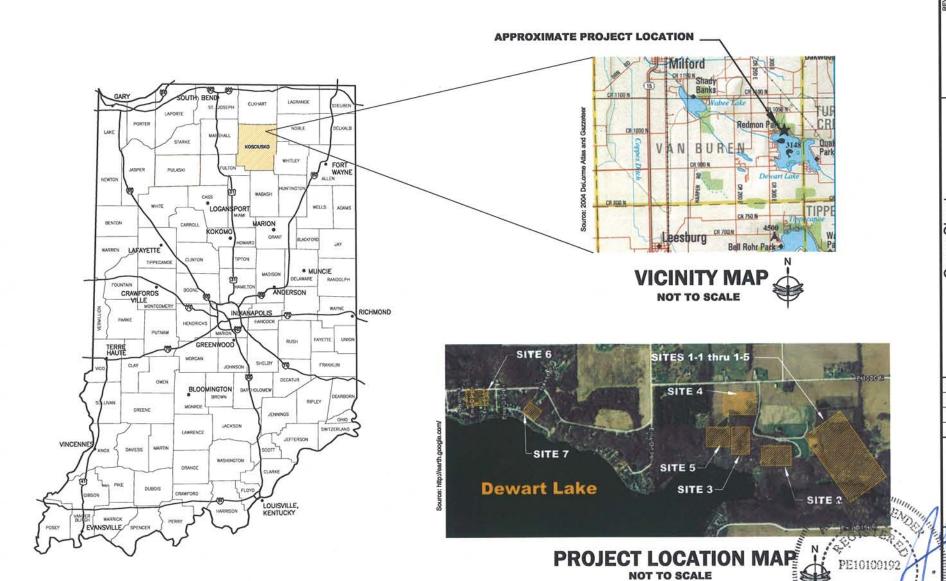
Dewart Lake Ravine Stabilization

IDNR Lake and River Enhancement (LARE) Project Kosciusko County, Indiana

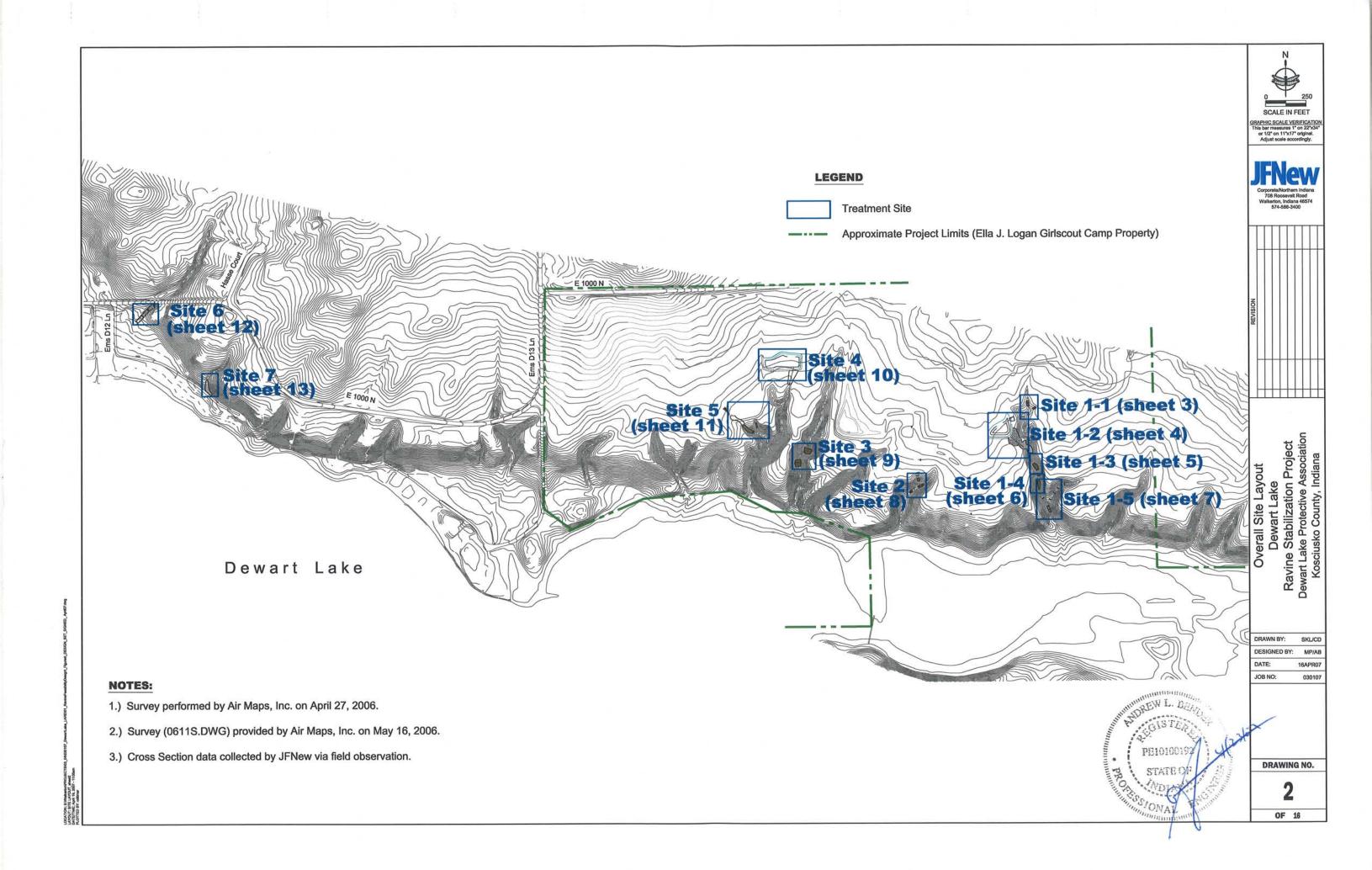
sponsored by: Dewart Lake Protective Association

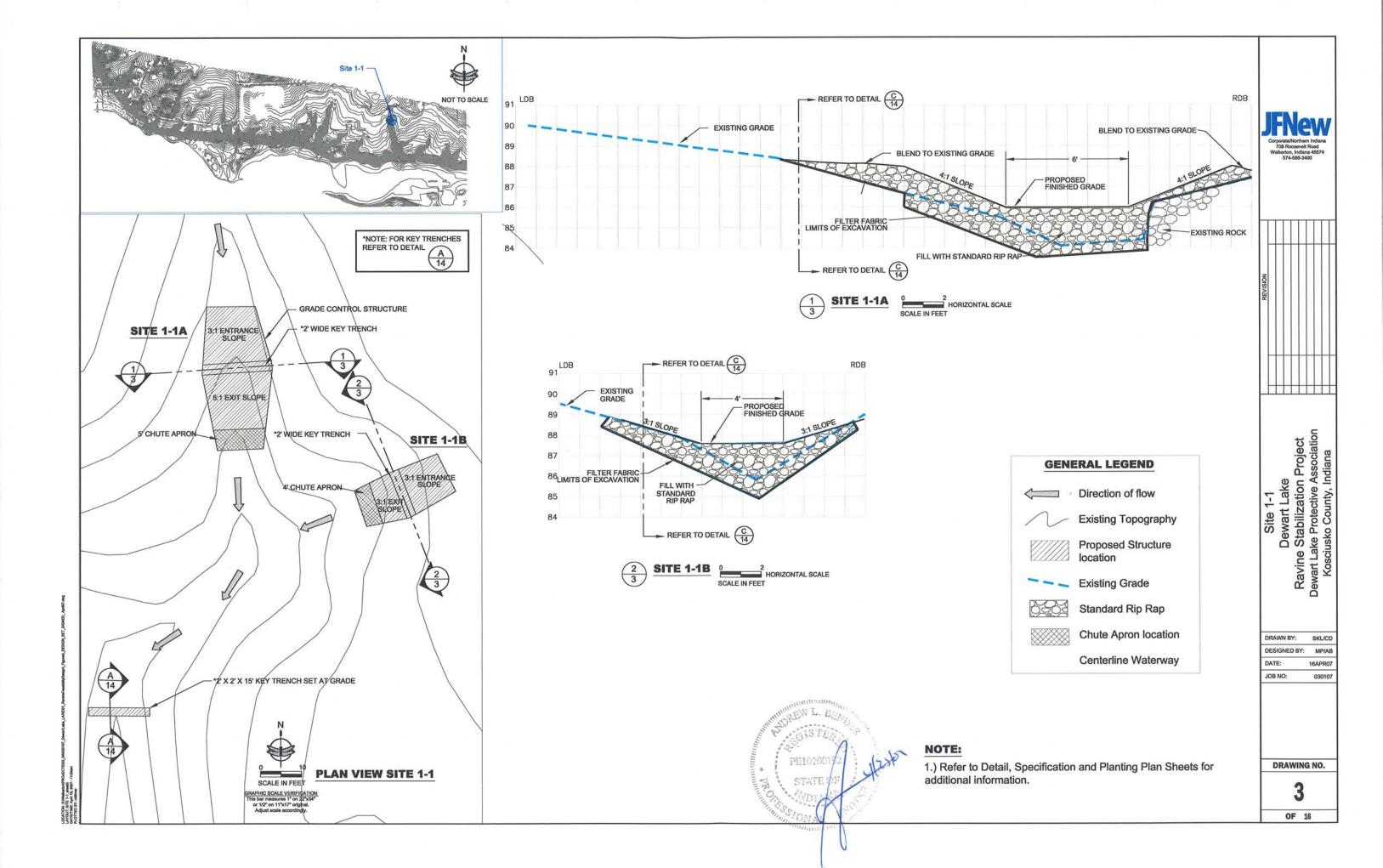
SHEET INDEX

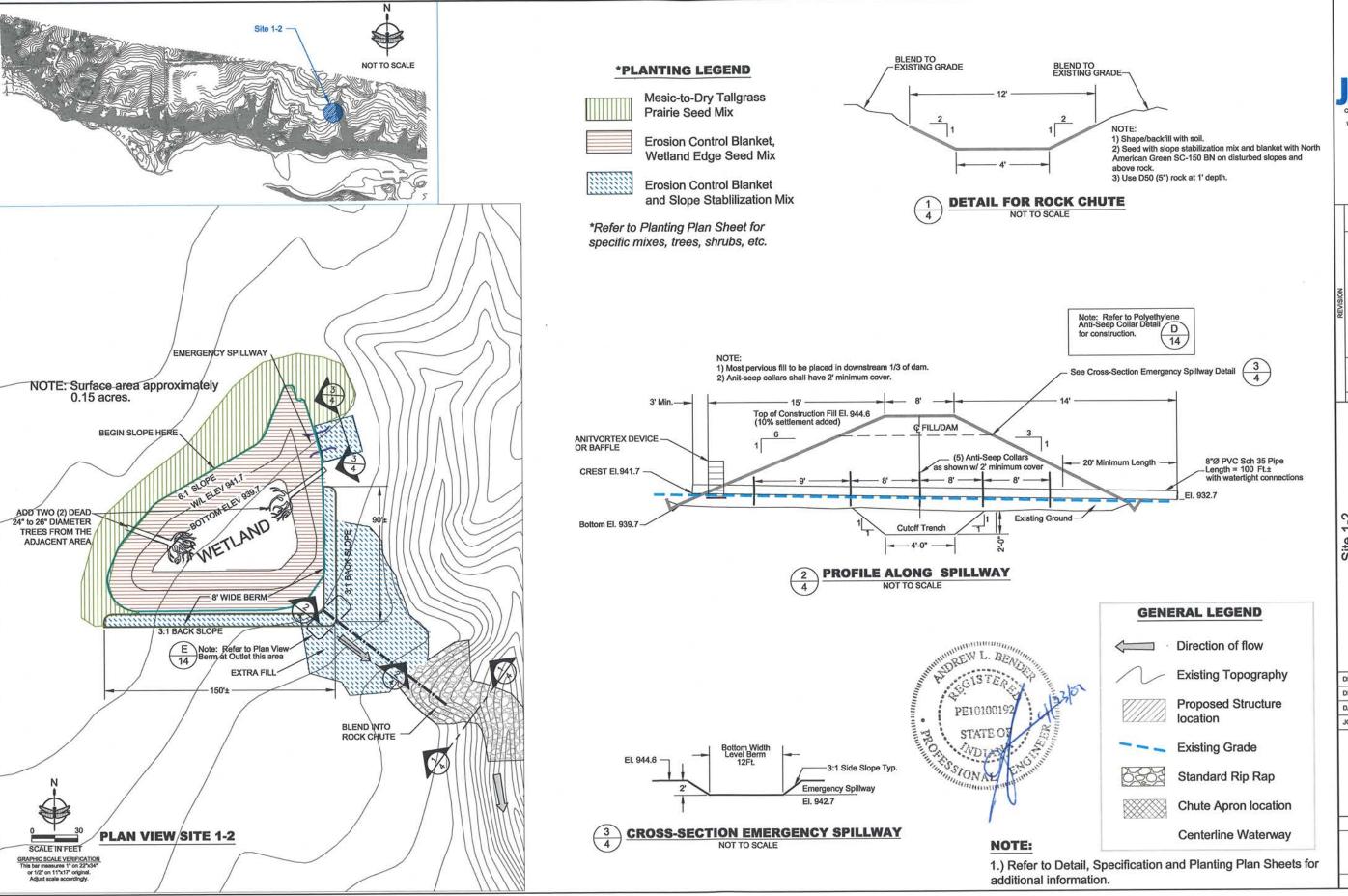
SHEET	DESCRIPTION	
1	COVER	
2	OVERALL SITE LAYOUT	
3	SITE 1-1 PLAN	
4	SITE 1-2 PLAN	
5	SITE 1-3 PLAN	
6	SITE 1-4 PLAN	
7	SITE 1-5 PLAN	
8	SITE 2 PLAN	
9	SITE 3 PLAN	
10	SITE 4 PLAN	
11	SITE 5 PLAN	
12	SITE 6 PLAN	
13	SITE 7 PLAN	
14	DETAILS	
15	SPECIFICATIONS	
16	PLANTING PLAN	



Cover Sheet
Cover



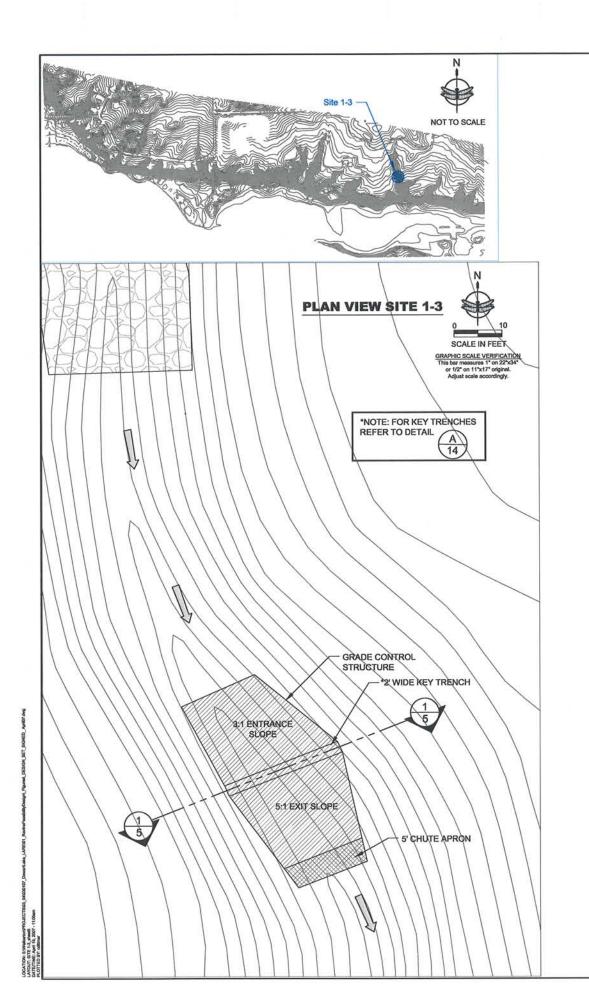


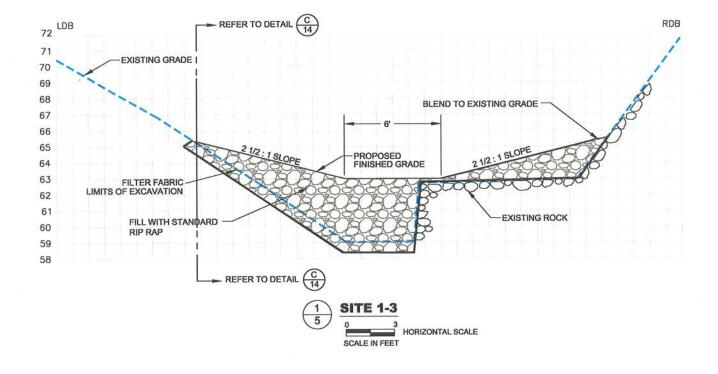


Site 1-2
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

DRAWN BY: DESIGNED BY: MP/AB DATE: 16APR07 JOB NO: 030107

DRAWING NO.





Direction of flow Existing Topography Proposed Structure location Existing Grade Standard Rip Rap Chute Apron location Centerline Waterway



NOTE:

1.) Refer to Detail, Specification and Planting Plan Sheets for additional information.

Corporate/Northern Indiana 708 Roosevelt Road Walkerton, Indiana 46574 574-588-3400

KEVISION

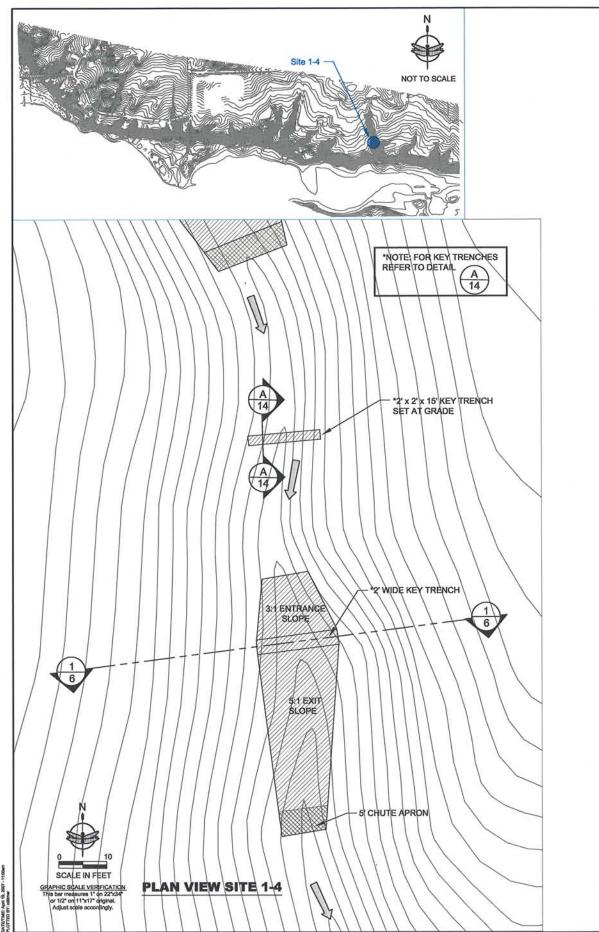
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

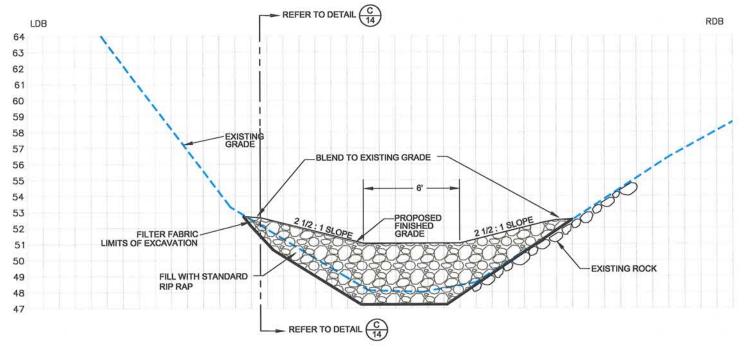
DRAWN BY: SKL/CD
DESIGNED BY: MP/AB
DATE: 16APR07

JOB NO: 030107

DRAWING NO.

5



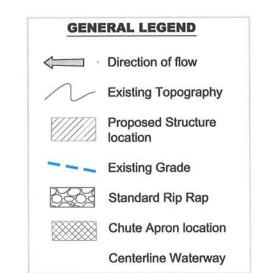


SITE 1-4

SCALE IN FEET

HORIZONTAL SCALE





NOTE:

1.) Refer to Detail, Specification and Planting Plan Sheets for additional information.

Corporate/Northern Indiana 708 Rocsewell Road Walkerfon, Indiana 46574 574-586-3400

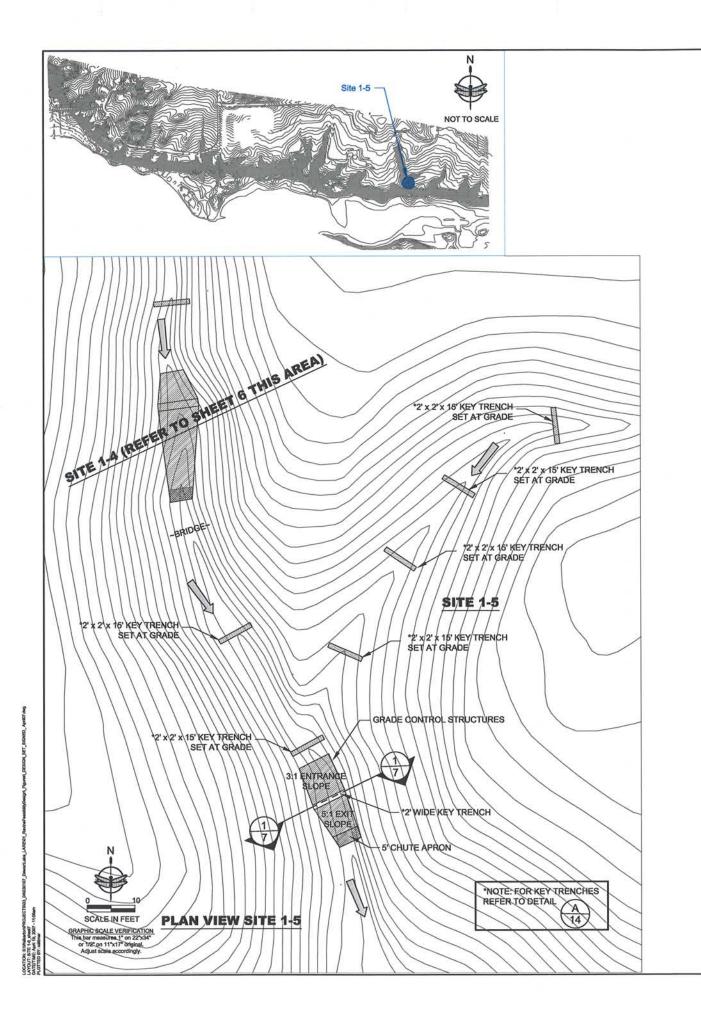
REVISION

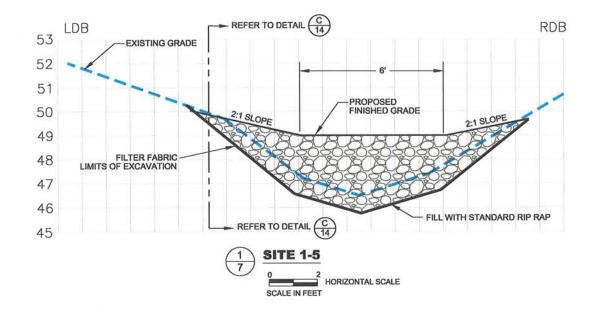
Site 1-4
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County Indiana

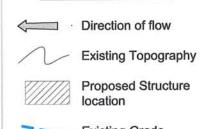
DRAWN BY: SKL/CD
DESIGNED BY: MP/AB
DATE: 16APR07
JOB NO: 030107

6 of 16

DRAWING NO.







GENERAL LEGEND

Existing Grade

Standard Rip Rap

Chute Apron location

Centerline Waterway



NOTE:

1.) Refer to Detail, Specification and Planting Plan Sheets for additional information.



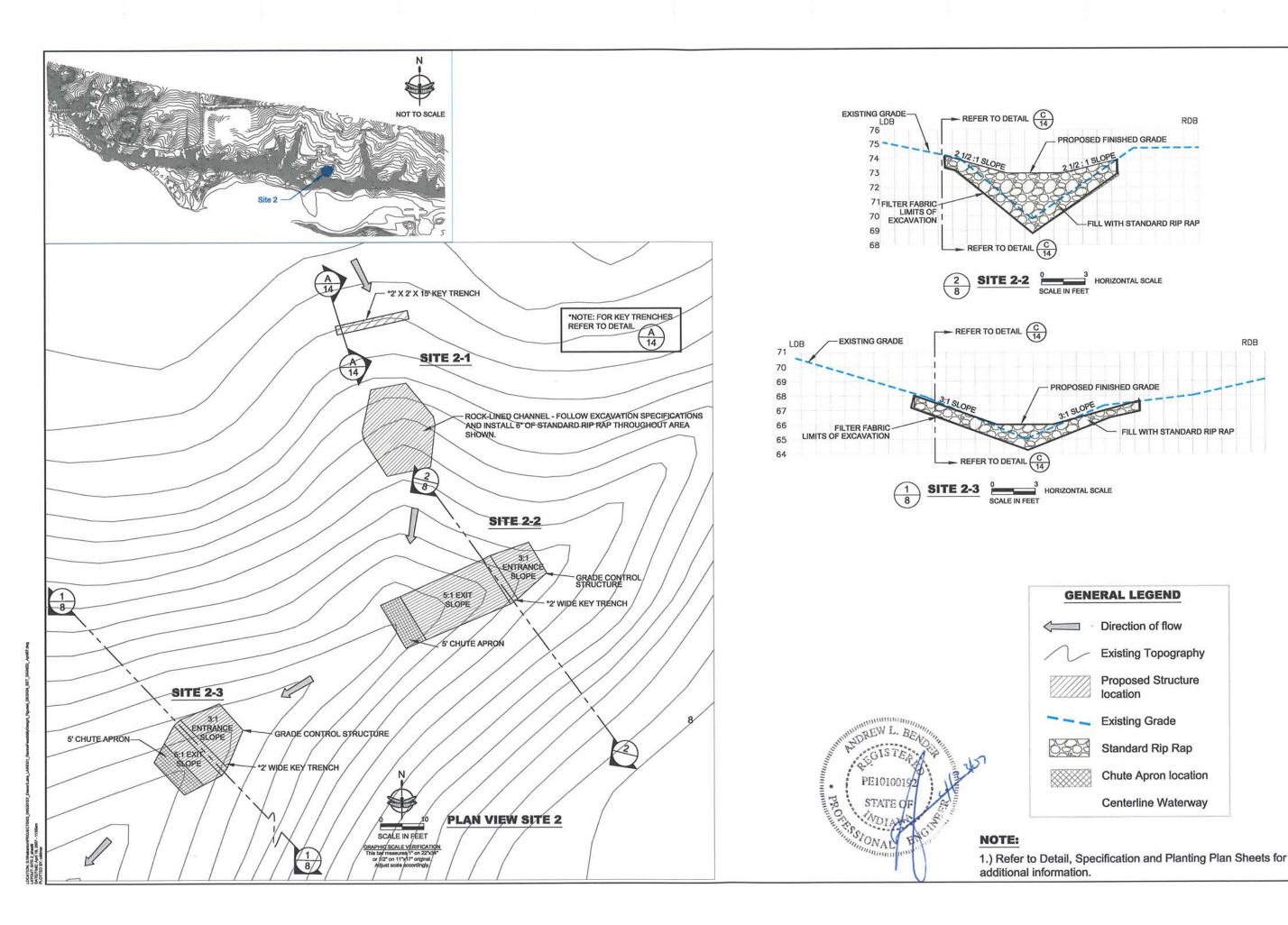


Site 1-5
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

DRAWN BY: SKL/CD
DESIGNED BY: MP/AB
DATE: 16APR07
JOB NO: 030107

DRAWING NO.

7



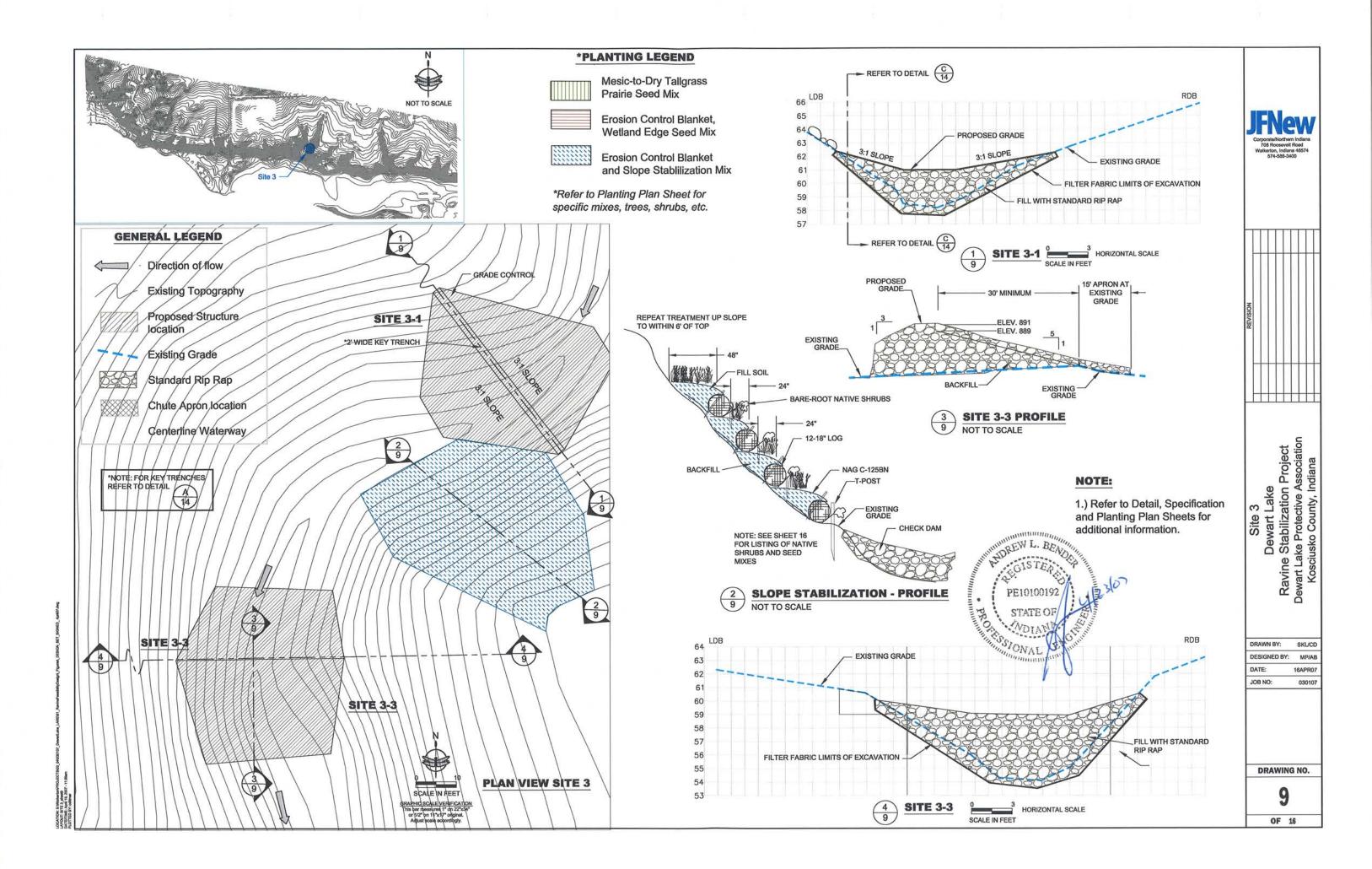


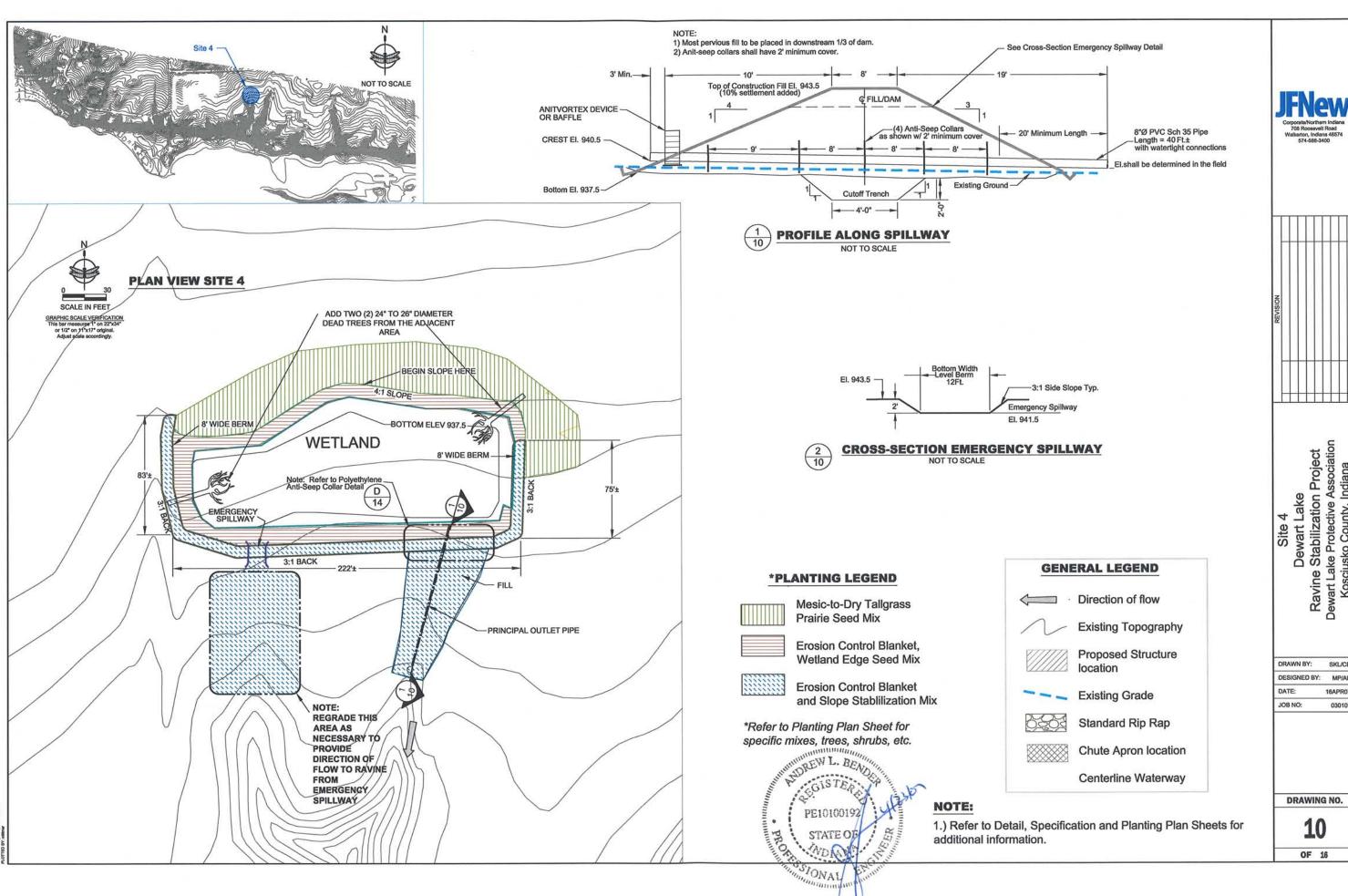
RDB

Site 2
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

DRAWN BY: SKL/CD DESIGNED BY: MP/AB DATE: 16APR07 JOB NO: 030107

DRAWING NO.



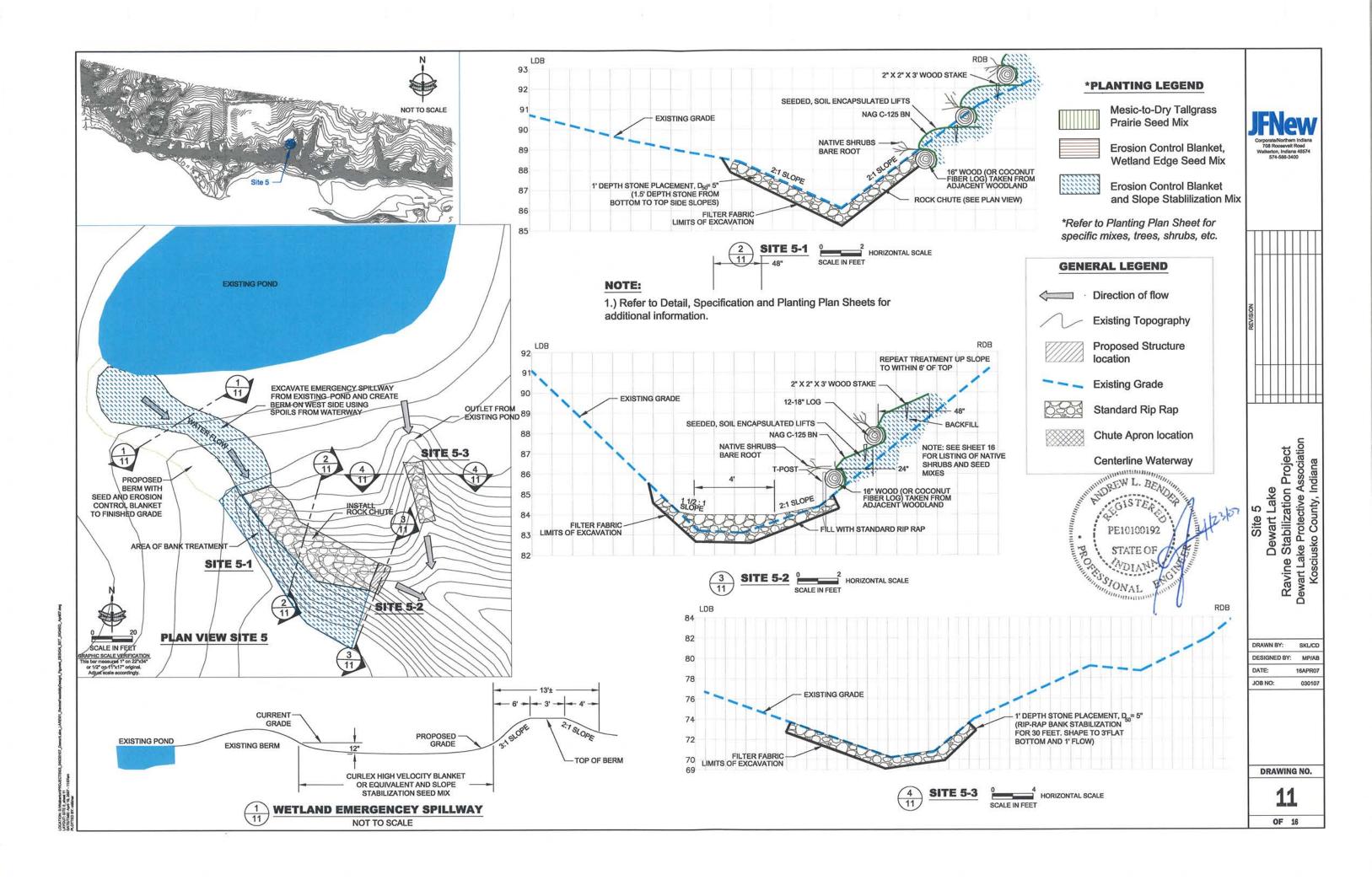


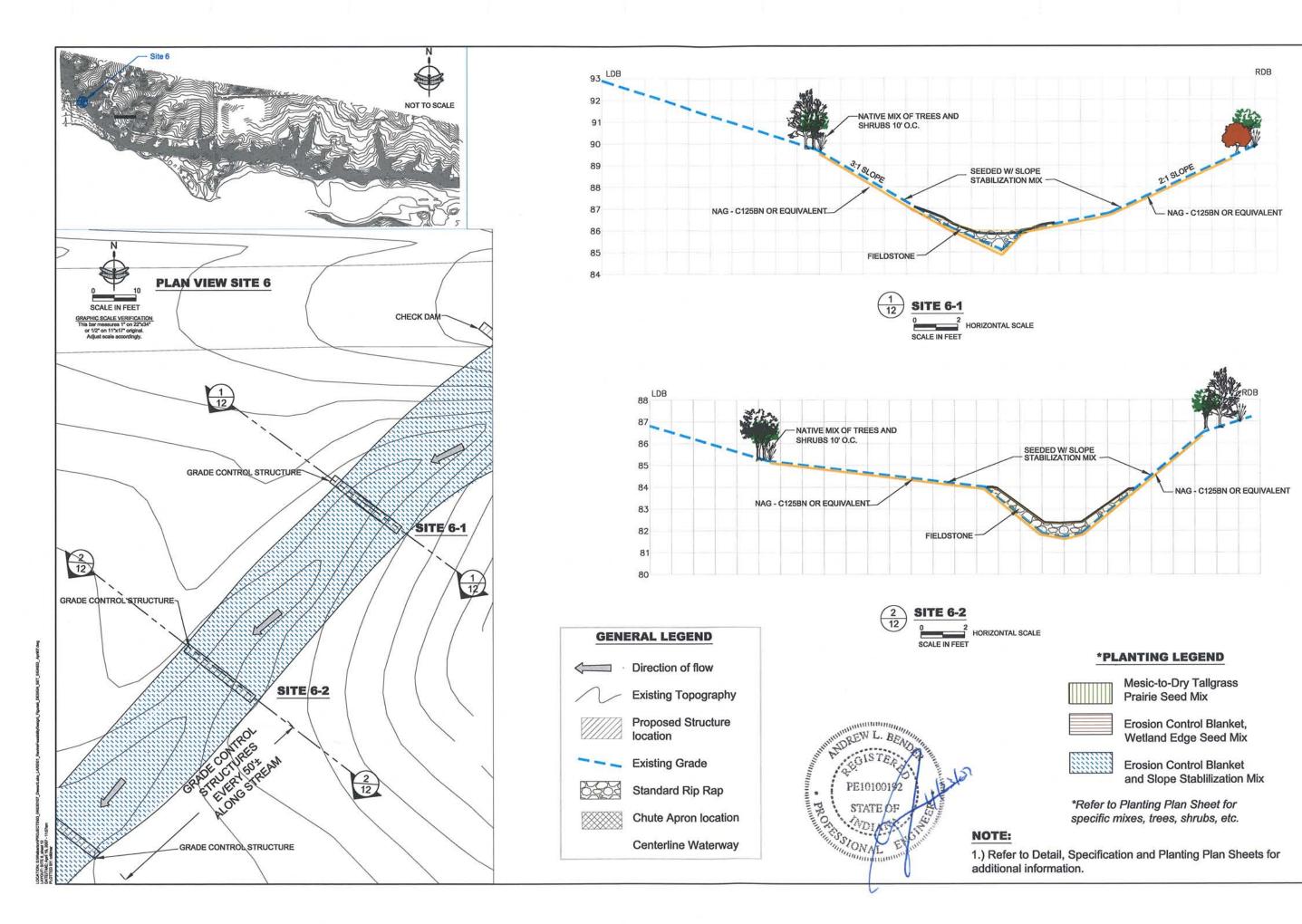
Site 4
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

DRAWN BY: SKL/CD DESIGNED BY: MP/AR 16APR07

JOB NO: 030107

DRAWING NO.





Corporate/Northern Indiana 708 Roosevelt Road Walkerton, Indiana 46574 574-589-3400



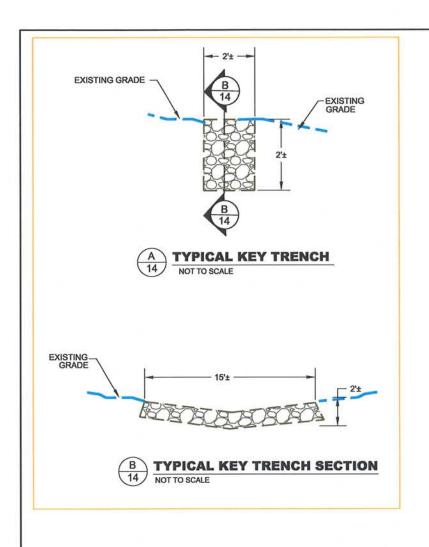
Site 6
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

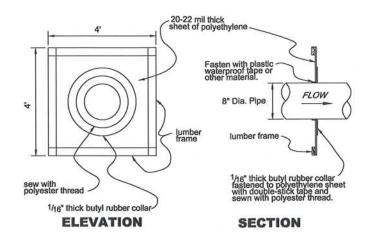
DRAWN BY: SKL/CD
DESIGNED BY: MP/AB
DATE: 16APR07

JOB NO: 030107

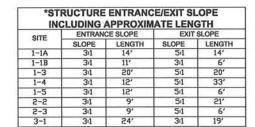
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12

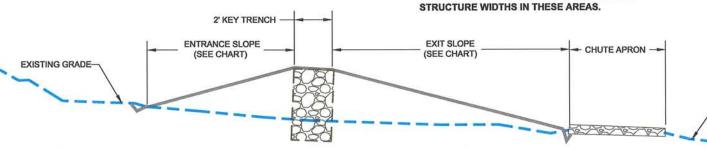




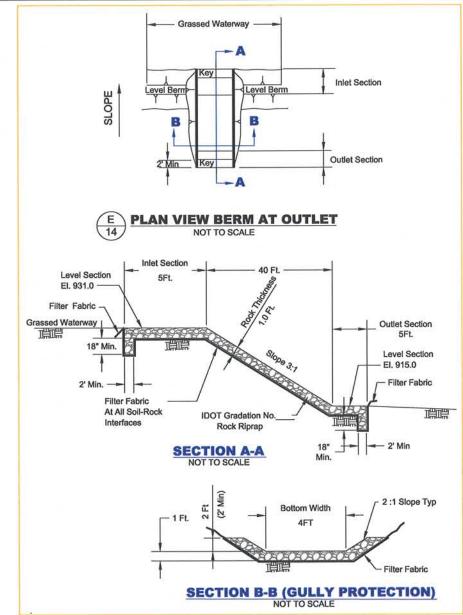
POLYETHYLENE ANTI-SEEP COLLAR DETAIL NOT TO SCALE



*REFER TO INDIVIDUAL SITE PLAN SHEET FOR



TYPICAL PROFILE FOR GRADE CONTROL STRUCTURE NOT TO SCALE

















Centerline Waterway





Typical Details
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

DRAWN BY: SKL/CD DESIGNED BY: MP/AB DATE: 16APR07 JOB NO: 030107

DRAWING NO.

GENERAL SPECIFICATIONS:

1. SITE CONDITIONS

- a) Adjustment of elevations will be required in the field.
- b) Field fit grade control structures to existing conditions.
- c) Field verify all distances, elevations and materials prior to installation.

2. FILTER FABRIC

- a) Filter fabric shall extend to the limits of excavation as shown.
- b) Filter fabric shall meet the following conditions. Fabric shall be 6 oz./square yard non-woven/non-heat bonded geotextile cloth.
- c) Fabric shall be keyed into existing ground upstream of the graduated structure.
- d) Splices shall overlap a minimum of 24 inches.

3. RIP RAP

- a) Standard rip rap shall meet or exceed INDOT standard revetment rip rap.
- b) Rip rap shall have an average diameter of 5-7 inches.
- c) Rock shall be compacted with placement equipment.
- c) Upon completion the placement of rip rap shall present a workmanlike finish. Contractor shall remove excess rip rap from construction site. Contractor shall not dispose of excess rip rap along slopes.

4. EXCAVATION

- a) Excavation of all organic material and top soil shall occur prior to the placement of any fabric. The minimum depth of all excavation shall be 6 inches.
- b) Slopes in site areas will be seeded and blanketed per the Planting Plan. All other disturbed areas will be fertilized and mulched to reestablish the existing ground as it was found prior to the beginning of project as shown.
- c) Mulch shall be defined as 55 bales of clean straw per acre.

5. KEY TRENCHES

a) Key trenches shall have a minimum width of 2 feet and shall not exceed a maximum width of 3 feet.

6. CHUTE APRON

- a) Filter fabric shall extend to the limits of excavation.
- b) Rock for apron shall be installed so that at the downstream end of the apron a minimum of 6" of rock remains and is installed to match the existing grade.

7. ANTI-SEEP COLLARS

a) Install Anti-Seep Collars according to industry standards.



REVISION	REVISION	REVISION	_	_	_	_	_	_	_	_	_	_
REVISION	REVISION	REVISION										
REVISION	REVISION	REVISION										
ZEVISION	REVISION	REVISION										
			REVISION									

SPECIFICATIONS
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association

DRAWN BY: SKL/CD
DESIGNED BY: MP/AB
DATE: 16APR07

JOB NO: 03010

DRAWING NO.

15

Plant Plugs for Site 1-2			
Botanical Name	Common Name	No. of Plants	
Acorus calamus	Sweet Flag	38	
Asclepias incarnata	Swamp Milkweed	38	
Carex comosa	Bristly Sedge	38	
Carex lacustris	Common Lake Sedge	38	
Eupatorium maculatum	Spotted Joe-Pye Weed	38	
Lobelia cardinalis	Cardinal Flower	38	
Peltandra virginica	Arrow Arum	38	
Scirpus validus	Great Bulrush	38	
Verbena hastata	Blue Vervain	38	
	Total	342	

11	Bare	Root	Shrubs	for	Site	3

Botanical Name	Common Name	No. of Plant
Cornus floria	Flowering Dogwood	75
Lindera benzoin	Spicebush	50
Viburnum prunifolium	Black Haw	50
	Total	175

Bare Root Shrubs for Site 5

Botanical Name	Common Name	No. of Plants
Cornus floria	Flowering Dogwood	75
Lindera benzoin	Spicebush	75
Viburnum prunifolium	Black Haw	90
	Total	240

Recommended Potted Stock for Site 6

Botanical Name	Common Name	No. of Plan
Cercis canadensis	Eastern Redbud	10
Cornus floria	Flowering Dogwood	10
Lindera benzoin	Spicebush	10
Viburnum prunifolium	Black Haw	10
	Total	40

Plant Plug for Site 4

Botanical Name	Common Name	No. of Plant
Acorus calamus	Sweet Flag	38
Asclepias incarnata	Swamp Milkweed	38
Carex comosa	Bristly Sedge	38
Carex lacustris	Common Lake Sedge	38
Eupatorium maculatum	Spotted Joe-Pye Weed	38
Lobelia cardinalis	Cardinal Flower	38
Peltandra virginica	Arrow Arum	38
Scirpus validus	Great Bulrush	38
Verbena hastata	Blue Vervain	38
	Total	342

Seed Mixes for Site 1-2 a	nd Site 4	
Wetland Edge Seed Mix Mesic-to-Dry Tallgrass Prairie Seed Mix	Site 1-2 0.1 acres 0.25 acres	Site 4 0.1 acres 0.25 acres

Wetland Edge Seed Mix		
		PLS
Botanical Name	Common Name	Ounces/Acre
Permanent Grasses/Sedges:		
Carex lurida	Bottlebrush Sedge	4.00
Carex frankii	Franks Sedge	4.00
Carex vulpinoidea	Brown Fox Sedge	3.00
Eleocharis palustris	Spike Rush	1.50
Elymus virginicus	Virginia Wild Rye	14.00
Glyceria striata	Fowl Manna Grass	2.00
Leersia oryzoides	Rice Cut Grass	2.00
Scirpus atrovirens	Green Bulrush	2.00
Scirpus pungens	Chairmakers rush	2.00
Scirpus validus	Great Bulrush (Softstem)	4.00
2007 30240000004400	Total	38.50
Temporary Cover:		
Avena sativa	Seed Oats	360.00
Lolium multiflorum	Annual Rye	100.00
	Total	460.00
Forbs:		
Actinomeris alternifolia	Wingstem	0.75

	Forbs:		
	Actinomeris alternifolia	Wingstem	0.75
	Alisma spp.	Water Plantain	3.00
	Asclepias incarnata	Swamp Milkweed	4.00
	Aster simplex/puniceus	Panicled/swamp Aster	1.00
	Bidens spp.	Bidens, various	2.00
	Cassia hebecarpa	Wild Senna	1.25
	Eupatorium perfoliatum	Boneset	1.00
	Helenium autumnale	Sneezeweed	2.00
	Hibiscus spp.	Rosemallow, various	1.75
	Iris virginica shrevei	Blue Flag Iris	3,50
	Lobelia siphilitica	Blue Lobelia	1.00
	Ludwigia alternifolia	Seedbox	0.25
	Mimulus ringens	Monkey Flower	1.50
	Rudbeckia laciniata	Cut-Leaf Coneflower	0.75
	Sagittaria latifolia	Broad-Leaf Arrowhead	2.00
	Verbena hastata	Blue Vervain	1.50
	Vernonia spp.	IronWeed, various	2.00
	757	Total	29.25
_	Mesic-to-Dry TallGrass	Drainia Saad Miy	
	mesic-to-bry randrass	rianie Seed mix	PLS
	The Contract was a second	AMERICAN STRUCTURE OF THE STRUCTURE OF T	

		PLS
Botanical Name	Common Name	Ounces/Acre
Permanent Grasses:		
Andropogon gerardii	Big Blue Stem	30.50
Andropogon scoparius	Little Blue Stem	20.00
Bouteloua curtipendula	Side Oats Grama	16.00
Carex bicknelli/molest/brevior	Prairie Sedge Mix	1.50
Elymus canadensis	Prairie Wild Rye	18.00
Panicum virgatum	Prairie Switch Grass	1.50
Sorghastrum nutans	Indian Grass	24.00
	Total	111.50
Temporary Cover:		
Avena sativa	Seed Oats	360.00
Lolium multiflorum	Annual Rye	120.00
DECEMBER PROPERTY.	Total	480.00
Forbs:		
Anemone cylindrica	Thimbleweed	1.00
Asclepias tuberosa	Butterfly Weed	1.25
Aster azureus	Sky-blue Aster	0.75
Aster laevis	Smooth Blue Aster	0.50
Aster novae-angliae	New England Aster	1.00
Saptisia leucantha	White Wild Indigo	1.50
Saptisia leucophaea	Cream Wild indigo	0.75
Cassia fasciculata	Partridge Pea	7.00
Coreopsis palmata	Prairie Coreopsis	0.25
Desmanthus illinoensis	Illinois Sensitive Plant	2.00
Desmodium illinoiense	Illinois Tick Trefoil	1.00
Echinacea purpurea	Purple Coneflower	3.00
Eryngium yuccifolium	Rattlesnake Master	2.00
espedeza capitata	Round-Headed Bush Clov	2.00
Liatris aspera	Rough Blazing Star	2.50
Liatris pycnostachya	Prairie Blazing star	2.00
Lupinus perennis	Wild Lupine	1.00
Monarda fistulosa	Prairie Bergamot	0.50
Parthenium integrifolium	Wild Quinine	2.00
Potentilla arguta	Prairie Cinquefoil	0.50
Pycnanthemum virginianum	Virginia Mountain Mint	0.25
Ratibida pinnata	Yellow Coneflower	3.00
Rudbeckia hirta	Black-Eved Susan	1.50
Silphium integrifolium	Rosin Weed	3.00
Silphium laciniatum	Compass Plant	2.00
Silphium terebinthinaceum	Prairie Dock	3.00
Solidago nemoralis	Old-field Goldenrod	1.00
Solidago rigida	Stiff Goldenrod	2.00
Solidago speciosa	Showy Goldenrod	1.00
Veronicastrum virginianum	Culvers Root	0.75
Zizia aptera	Heart-leaved Meadow Par	0.50
	Total	50.50
Annual/Perennial Forbs Mix		32.00

Slope Stabilizat	ion Seed Mixes for	Sites 1-2, 3, 4, 5 an	d 6
	Site 1-2	Site 3	Site 4
Slope Stabilization Seed Mix	0.25 acres	1 acre	0.25 acres
COUNTY TO SERVICE THE PROPERTY OF THE PROPERTY	Site 5	Site 6	
	1 acre	0.25 acres	

1	1 acre	0.23 acres
Slope Stabilization Seed	i Mix	
		PLS
Botanical Name	Common Name	Ounces/Acre
Permanent Grasses:		
Andropogon gerardii	Big Bluestem Grass	20.00
Andropogon scoparius	Little Bluestem Grass	32.00
Bouteloua curtipendula	Side-Oats Grama	5.00
Bromus pubescens	Woodland Brome	4.00
Elymus canadensis	Canada Wild Rye	18.00
Hystrix patula	Bottlebrush Grass	16.00
Panicum virgatum	Switch Grass	16.00
Sorghastrum nutans	Indian Grass	24.00
	Total	135.00
Temporary Cover:		
Avena sativa	Seed Oats	552.00
Lolium multiflorum	Annual Rya	200.00

PLANTING LEGEND



*Mesic-to-Dry Tallgrass Prairie Seed Mix



*Erosion Control Blanket, Wetland Edge Seed Mix



*Erosion Control Blanket (Curlex High Velociy or Equivalent), Slope Stabilization Mix

PE10100192

*Refer to Planting Plan Sheet for specific mixes, trees, shrubs, etc.



REVISION	
2	

PLANTING PLAN
Dewart Lake
Ravine Stabilization Project
Dewart Lake Protective Association
Kosciusko County, Indiana

DRAWN BY: SKL/CD DESIGNED BY: MP/AB DATE: JOB NO:

DRAWING NO.

16

Appendix C.

Bid Documents

INVITING BIDS

FOR DEWART LAKE RAVINE STABILIZATION PROJECT AT THE NORTH END OF DEWART LAKE IN KOSCIUSKO COUNTY, INDIANA

Pursuant to I.C. 5-3-1 the Dewart Lake Protective Association (Owner), Kosciusko County, Indiana, will receive bid proposals until 4:00 pm on **September 1, 2007** at the location stated below for the construction of the: "**DEWART LAKE RAVINE STABILIZATION PROJECT**".

Bids shall be submitted on the enclosed documents. After a satisfactory bid is received the Dewart Lake Protective Association shall award a contract to the lowest responsible and responsive bidders.

Pursuant to I.C. 36-1-12-4(10), in determining whether a bidder is responsive the Dewart Lake Protective Association may consider the following factors:

- (1) Whether the bidder has submitted a bid or quote that conforms in all material respects to the specifications
- (2) Whether the bidder has submitted a bid that complies specifically with the invitation to bid and the instructions to the bidder.
- (3) Whether the bidder has complied with all applicable statutes, ordinances, resolutions, or rules pertaining to the award of a public contract.

Pursuant to I.C. 36-1-12-4(11), in determining whether a bidder is a responsible bidder, the Dewart Lake Protective Association may consider the following factors:

- (1) The ability and capacity of the bidder to perform the work.
- (2) The integrity, character, and reputation of the bidder.
- (3) The competency and experience of the bidder.

Bids shall be submitted to:

JFNew Mark Pranckus 708 Roosevelt Rd Walkerton, IN 46574

INSTRUCTIONS TO BIDDERS

TITLE AND LOCATION OF THE WORK: The work on this contract is identified as: **Dewart Lake Ravine Stabilization Project**, located on the north side of Dewart Lake with five sites located within the Ella J. Logan Campground and two sites located south of CR 1000 S., Indiana.

SPECIFICATIONS: Specifications to be used in the construction of this project are contained herein.

PROPOSALS: Bid proposals shall be submitted on the forms provided herein.

INTERPRETATION OF THE PLANS AND SPECIFICATIONS: If any person contemplating submitting a bid for this work is in doubt as to the true meaning of any part of the Plans, Specifications or other proposed contract documents, he or she may submit a written request to the Owner for interpretation thereof. The Owner will not be responsible for any other explanations or interpretations of the contract documents.

ADDENDA: Any addenda issued during the time of bidding, or forming a part of the contract documents given to the bidder for preparation of his or her proposal, shall be covered in the proposal and shall be made a part of the proposal. Receipt of each addendum shall be acknowledged and attached to the proposal.

AWARD OF THE CONTRACT: After a satisfactory bid is received the Dewart Lake Protective Association shall award a contract to the lowest responsible and responsive bidders on or before September 15, 2007.

BIDDERS LUMP SUM PROPOSAL

Kosciusko County, Indiana

Instructions to Bidders:

All Bidders shall utilize this form. Except as otherwise specifically provided, all parts shall be fully and accurately filled in and completed.

Proje	ct: DEWART LAKE RAVINE STABILIZATION PROJECT
Date:	
То:	Mark Pranckus JFNew Dewart Lake Ravine Stabilization Project 708 Roosevelt Rd Walkteron, IN 46574
	PART 1 BIDDER INFORMATION (Print or Type)
1.0	Bidder Name:
2.0	Bidders Address:
	City: State: Zip:
	Phone: () Fax:
3.0	Bidder is a/an [mark one]:
	Individual Partnership Indiana Corporation Foreign (Out of State) Corporation Joint Venture Other:
1.4	Bidders Federal ID No

PART 2 PROPOSAL (BID)

2.1	apparatus, materia fulfill all obligati provided by the to addenda thereto, to (2) sections of sloy (2) wetlands. Cle	Bidder proposes to furnish all nolls, equipment, service and other necessors incident thereto in strict according to the construction of the Contract to construction seven (7) rock grade to estabilization, three (3) sections of an-up and mobilization/demobilization set will be completed for the total services.	essary supplies, and to perform and dance with and within the time(s) Documents, including any and all controls, nine (9) rock weirs, two rock channel stabilization, and two on fees will be included. All work
	· · · · · · · · · · · · · · · · · · ·		Dollars (\$
		<u>).</u>	2 011115 (4
	Signed the	day of	, 2007
	Bidder/Contra	ctor - Signature	
	Name - P	rinted	

PART 3 BID SCOPE OF SERVICES

Bidder shall excavate and install seven rock grade controls, nine rock weirs, and three areas of rock channel stabilization in the locations and to the dimensions described in the Dewart Lake Ravine Stabilization Plan set. In addition, bidder shall stabilize two areas of eroding slope and excavate two wetlands. Slope stabilization areas and wetlands shall be planted with the native species as called for in the plan set. Bidder shall utilize the erosion and construction materials as outlined in the plan set. Any substitutions or equivalents shall receive written approval from the Dewart Lake Protective Association or their agent prior to installation. Bid price shall include mobilization, demobilization, installation, materials and clean-up of project sites and any areas disturbed during construction. Bidder shall regularly provide written or verbal communication to the Dewart Lake Protective Association and/or their agent, on the progress of the project.

PART 4 CONTRACT DOCUMENTS AND ADDENDA

- 1.0 The bidder agrees to be bound by the terms and provisions of all Contract Documents and incorporates such Contract Documents herein by reference.
- 2.0 The Bidder acknowledges receipt of the following addenda:

Addendum Number	<u>Date</u>

CONTRACT

THIS AGREEMENT, made and entered into b	by and	betwo	een tr	ne Dewar	t Lake	Protective
Association, as party of the first part, hereinafter ca	alled th	e "Ow	ner a	nd		
	, as	party	of the	e second	party,	hereinafter
called the "Contractor"						
WITNES	SSTH					

That for and in consideration of the mutual covenants herewith enumerated, the Owner does hereby hire and employ the Contractor to furnish all materials, equipment and labor necessary to fully construct the work designated as follows:

DEWART LAKE RAVINE STABILIZATION PROJECT KOSCIUSKO COUNTY, INDIANA

According to the plans, standard specifications, supplemental specification	s, profiles and
drawings therefrom, and any supplemental or special provisions set out or re	ferred to in the
Contractor's attached Proposal, and hereby agrees to pay the Contractor therefore	or, for the actual
amount of work done and materials in place, as measured and approved by the I	Engineer or duly
authorized representative, for the lump sum price as stated in the Contractor's	attached Lump
Sum Bid Proposal dated, which sum	the Contractor
agrees to accept as full payment for such construction work; and	

IT IS FUTHER MUTALLY AGREED:

That the accompanying Proposal together with the plans, standard and supplemental specifications and special provisions herein designated and referred to, are hereby made a part of the Contract the same as if herein fully set forth; and

That the Contract amount may be paid to the Contractor upon progress estimates of completed and approved work prepared by the Engineer, in an amount not exceed Eighty Five Percent (85%) of such estimates, Fifteen Percent (15%) shall be withheld by the Crooked Lake Association for a period sixty (60) days after the completion of the work, for the purpose of securing payment of all properly prepared and certified statements of indebtedness which shall have been filed against the Contractor for labor performed and materials furnished or other services rendered in carrying forward, performing and the completing of this contract, and such estimates shall also be subject to the provisions of the Standard Specifications on file in the office of the Owner and made a part hereof; and that before any estimate is paid to the Contractor, he shall furnish receipts for all debts incurred in the prosecution of such work or satisfactory evidence and assurance that the same have been paid; or shall consent to the withholding by Owner from his final estimate of sums sufficient to cover such indebtedness, which sums may be held until such indebtedness is settled, or until conclusion of any litigation in the relation thereto filed within such period; and that no monies due on this final estimate shall be paid until the work is fully completed and accepted as provided in the Specifications.

CONTRACT 1 OF 2

	der has hereunto set his hand thisday of
, 2007.	
	Contractor
	By
	ewart Lake Protective Association does hereby accept the set their hands this day of
	Dewart Lake Protective Association Syracuse, Indiana
	Kyle Young, President

Appendix D.

Monitoring and Maintenance Forms

Maintenance and Monitoring Form for Dewart Lake Ravine Stabilization Projects

Page 1

Date:	Inspected By:
Site Location	

Construction Feature	Monitoring	Indicators -Action	Action Request	
Inspection of Rock Grade Controls, Rock Key Trenches, and Rock-lined Channels	Is erosion occurring around or through rock structures? Has rock been moved or displaced?	 Yes – Replace rock; consult design plans. No – Rock structures are working properly. 	Date: Initials:	
	Is sediment building behind rock grade controls?	Yes – Grade control is working. Continue to monitor. No – Erosion may be reduced. Monitor further downstream for signs of sedimentation.	Date: Initials:	
Slope Stabilization	Is slope continuing to slump?	Yes – Inspect vegetation and erosion control materials No – No action.	Date: Initials:	
	Is vegetation becoming established in stabilization areas?	 Yes – No action No – Overseed with additional seed. 	Date: Initials:	
	Are erosion control materials (logs, blanket) degrading? Are the materials torn or ripped?	 Yes – Determine if additional material is needed; depends on slope stability. No – No action. 	Date: Initials:	
Wetlands	Is berm free from animal holes and woody vegetation?	 Yes – No action. No – Fill animal holes. Burn or mow berm. 	Date: Initials:	
	Is outlet structure in wetland free of obstructions?	Yes – No action. No – Remove obstructions.	Date: Initials:	
	Is erosion occurring along principal spillway or emergency spillway? Is erosion occurring anywhere else?	 Yes – Determine severity and consult maintenance section in feasibility report. No – No action. 	Date: Initials:	
Site 7 (Rock-lined Channel	Is the outlet pipe clear of obstructions?	Yes – No action. No – Remove obstructions	Date: Initials:	
General Site Conditions	Has land use or drainage patterns significantly changed?	Yes – Monitor structures for changes No – Continue to monitor.	Date: Initials:	

Maintenance and Monitoring Form for Dewart Lake Ravine Stabilization Projects Inspected By:_____ Site Location_____ Page 2 Other Observations and Actions: Current Weather Conditions (include general description of the previous two weeks of weather):

Helpful Reminders

- 1. Perform regular annual maintenance of constructed features. Inspection during and immediate after a storm event also provides excellent feedback on how the structures are working.
- 2. Consult feasibility report and plan set for additional information.
- 3. Monitor areas around other ravines.
- 4. Make note of changes to land use and drainage patterns.
- 5. Contact environmental consultant, local NRCS office, or other natural resource professional if any questions develop during monitoring.

Appendix E.

Landowner Agreements



708 Roosevelt Road Walkerton, Indiana 46574 Phone: 574-586-3400 ext. 307 Fax: 574-586-3446

Mark Pranckus Aquatic Biologist email: mpranckus@jfnew.com

> Corporate Office: Walkerton, Indiana

Crete, Illinois

Indianapolis, Indiana

Ann Arbor, Michigan

Grand Haven, Michigan

Cincinnati, Ohio

Madison, Wisconsin

Native Plant Nursery: Walkerton, Indiana December 7, 2006

Limberlost Girl Scout Council Gary Hogle 203 EMS D14 Lane Syracuse, IN 46567

RE: Dewart Lake Ravine Stabilization Project

Dear Gary:

As you know, the Dewart Lake Protective Association is undertaking a ravine stabilization design project along ravines on the northern portion of the Dewart Lake shoreline to reduce erosion and sedimentation into the lake. During the preliminary feasibility-design phase, areas on the Camp Logan property where identified as potential locations for projects. In the proceeding paragraphs are narratives of the intended projects. A copy of the proposed design is included with this letter. For the project to proceed with construction, the Dewart Lake Protective Association needs your written signature stating that you understand and agree with the project as it is designed.

Site 1: Rock grade controls and stabilization; and wetland creation

Site 1 (Ravine No. 2) is a significantly eroding ravine located downstream from an existing detention pond constructed on the Limberlost Girl Scout property. There are three side ravines that enter the main ravine. The ravine stabilization design consists of using a combination of four rock grade controls and creating a wetland at the top of one of the side ravines. Three of the proposed grade controls are located where previous attempts using a similar technique to reduce erosion occurred. These structures failed because rock was placed only on one side of the ravine channel, which resulted in stormwater shifting to the opposite side of the channel. This eventually resulted in water eroding away the base of the slope. The new grade controls will be constructed using rock already present at these locations from the original stabilization techniques. Using the existing rock from the failed structures will be cost effective. A fourth rock grade control will be placed where a side ravine joins the main ravine. Additionally, rock will be placed in the side ravines in appropriate areas to prevent further erosion.

In addition to work within the ravine, a wetland at the top of a side ravine will be constructed. This will help to reduce the volume and velocity of water flowing through Ravine No. 2 during storm events. The wetland will also provide wildlife habitat for amphibians and frogs and educational opportunities for participants at the camp.

Site 2: Rock grade controls and stabilization

Site 2 (Ravine No. 3) is located directly downhill from the Girl Scout camp office. It consists of one main ravine with a smaller side ravine. The proposed project will include installing rock at the top of the side ravine to stop a headcut that has formed. Two rock grade controls are proposed on the main ravine. These will help to decrease water velocity before it reaches Dewart Lake.

Site 3: Sheetpile wall, rock grade control and bioengineered slope stabilization

Site 3 (Ravine No. 5) is located adjacent to the entrance road into the Camp Logan facilities. It consists of one main ravine with a severely eroding section. An NRCS-funded pipe drop structure is located at the base of the ravine. The proposed project will attempt to stabilize the slope and provide water retention to allow for sediment to drop out of the stormwater. The slope will be stabilized by installing a rock toe along the eroding section of slope, and using a combination of native plants, shrubs, and erosion material. A rock grade control structure will be installed downstream of the eroding slope to reduce the erosive force of the stormwater. A sheetpile wall will be installed downstream of the rock grade control structure to retain stormwater allowing sediment to settle out. Lastly, the accumulated sediment at the base of the existing pipe drop structure will be removed to increase the sediment storage capacity of the structure.

Site 4: Wetland creation

Site 4 (Ravine No. 6) is located to the west of Ravine No. 5. Ravine 6 consists of two small ravines coming together to form one main ravine. There is no major erosion occurring along the main ravine; however, a head cut is occurring at the top of one of the small ravines. If not addressed, this headcut will continue to erode, eventually contributing more and more sediment to the lake. The proposed project will create a small wetland at the top of both of the small ravines. The wetland will retain stormwater, allowing for sediment to drop out of the water flowing downstream, thereby reducing sediment loading to Dewart Lake. One ravine will be used as the primary spillway, which will release water from the wetland at a set elevation after it fills up during a storm event with stormwater. The head of the second small ravine will be re-graded so it can function as the wetland's emergency spillway, which will carry water overflowing from the wetland due to significant or "historical" storm events.

Site 5: Rock and slope stabilization; emergency outlet re-grading

Site 5 (Ravine No. 7) is located downstream of the existing pond on the Camp Logan property. Ravine No. 7 consists of one small ravine with severely eroding slopes due to stormwater from the pond's emergency spillway and a second short ravine that serves as the primary spillway for the pond. The slopes are eroding in the first ravine because the existing pond has very little stormwater storage capacity and overflows through the emergency spillway on a regular basis. The stormwater enters the ravine from the side slopes, creating a headcut that will eventually work back towards the spillway and pond. The proposed design will stabilize the eroding slopes by using a combination of native



plants, shrubs, and erosion control materials. The emergency spillway will be re-graded so that water from the spillway flows through a controlled course into the head of the ravine. This will restore what was likely the original water path. The head of the ravine will be lined with rock to dissipate the water's energy and allow for sediment to drop out. A rock check dam will be added to prevent any headcuts from downstream migrating further up the ravine. The ravine that is used for the primary spillway will be lined with rock to dissipate the water's energy; reducing the erosive potential of the water.

The Dewart Lake Protective Association is responsible for all costs associated with the construction of this project including site preparation, construction, and clean-up. Please sign below acknowledging your willingness to allow the temporary use of your property, as shown on the attachment, for completing the work described. All contractors having access to the site will be required to have liability insurance. We will let you know when funding has become available and provide you the timeframe for construction.

If you have any questions, please let me know. I can be reached at 574-586-3400. Thanks for taking the time to consider this project.

Best regards,

Mark Pranckus

I agree with the proposed design as it has been explained to me by the Dewart Lake Protective Association and/or their representative, JFNew, and by the documentation they have provided. I agree to grant access to the site to allow for construction of this project.

Gary Hogle (Property Manager)

Show Derdman, CEO Limberlost Girl Scout Council Representative

1/3/07 Date





708 Roosevelt Rd Walkerton, Indiana 46574 Phone: 574-586-3400 ext. 338 Fax: 574-586-3446

Mark Pranckus

Aquatic Biologist

mpranckus@jfnew.com Mobile: 574-229-8723

Corporate Office:

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Crete, Illinois

Indianapolis, Indiana

Ann Arbor, Michigan

Grand Haven, Michigan

Cincinnati, Ohio

Madison, Wisconsin

Native Plant Nursery:

Walkerton, Indiana

www.jfnew.com

October 17, 2006

Steven and Melody Miller 3511 E. 1000 N. Syracuse, IN 46567

RE: Dewart Lake Ravine Stabilization Project

Dear Mr. and Mrs. Miller:

The Dewart Lake Protective Association is undertaking a ravine stabilization design project along ravines on the northern portion of the Dewart Lake shoreline to reduce erosion and sedimentation into the lake. During the preliminary feasibility-design phase, areas on your property were identified as potential locations for projects. The proceeding paragraph details the intended project. A copy of the proposed design in included with this letter. For the project to proceed with construction, the Dewart Lake Protective Association needs your written signature stating that you understand and agree with the project as it is designed.

Site 6: Check dam stabilization along drainage

The proposed design pertains to the small ravine at the base of the hill north of EMS D12 Lane. The proposed design calls for the installation of a series of four field stone check dams in the channel of the drainage to slow stormwater down, thereby reducing erosion and sedimentation. The base and sides of the channel will be lined with the appropriate erosion fabric material and planted with a mixture of native plant species. The top of the channel banks will be planted with a mixture of bare-root and potted native tree and shrub species approximately ten feet on-center.

The Dewart Lake Protective Association is responsible for all costs associated with the construction of this project including site preparation, construction, and clean-up. By signing this letter, you indicate that construction can occur. We will contact you to let you know when we have received funding for the projects and the proposed project construction timeline. All contractors having access to the site will be required to have liability insurance.

Thank you,

Mark Pranckus

I agree with the proposed design as it has been explained to me by the Dewart Lake Protective Association and/or their representative, JFNew, and by the documentation they have provided. I agree to grant access to the site to allow for construction of this project.

Steven and Melody Miller

11-28-06

Y ONLY WORK (APPROACH DITCH FROM THE WEST SIDE. LEAVE GRASS AND PACKASANDRA ON EAST SIDE OF DITCH ALONE TREES ALONG DITCH (EAST SIDE) WITH THE MILLERS,



708 Roosevelt Rd Walkerton, Indiana 46674 Phone: 574-586-3400 ext. 338 Fax: 574-586-3446

Mark Pranckus

Aquatic Biologist

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Ann Arbor, Michigan

Grand Haven, Michigan

Cincinnati, Ohio

Madison, Wisconsin

Native Plant Nursery: Walkerton, Indiana October 17, 2006

Randolph and Tonja Busch 18 EMS D12 Lane Syracuse, IN 46567

RE: Dewart Lake Ravine Stabilization Project

Dear Mr. and Mrs. Busch:

The Dewart Lake Protective Association is undertaking a ravine stabilization design project along ravines on the northern portion of the Dewart Lake shoreline to reduce erosion and sedimentation into the lake. During the preliminary feasibility-design phase, areas on your property were identified as potential locations for projects. The proceeding paragraph details the intended project. A copy of the proposed design in included with this letter. For the project to proceed with construction, the Dewart Lake Protective Association needs your written signature stating that you understand and agree with the project as it is designed.

Site 6: Check dam stabilization along drainage

The proposed design pertains to the small ravine at the base of the hill north of EMS D12 Lane. The proposed design calls for the installation of a series of four field stone check dams in the channel of the drainage to slow stormwater down, thereby reducing erosion and sedimentation. The base and sides of the channel will be lined with the appropriate erosion fabric material and planted with a mixture of native plant species. The top of the channel banks will be planted with a mixture of bare-root and potted native tree and shrub species approximately ten feet on-center.

The Dewart Lake Protective Association is responsible for all costs associated with the construction of this project including site preparation, construction, and clean-up. By signing this letter, you indicate that construction can occur. We will contact you to let you know when we have received funding for the projects and the proposed project construction timeline. All contractors having access to the site will be required to have liability insurance.

Thank you

Mark Pranckus

I agree with the proposed design as it has been explained to me by the Dewart Lake Protective Association and/or their representative, JFNew, and by the documentation they have provided. I agree to grant access to the site to allow for construction of this project.

Randolph and Tonja Busch

11-28-06

www.jfnew.com



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Mark Pranckus

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Grand Haven, Michigan

Cincinnati, Ohio

Madison, Wisconsin

Native Plant Nursery: Walkerton, Indiana January 19, 2006

Dear Dewart Lake Area Property Owner:

JFNew is an environmental consultant hired by the Dewart Lake Protective Association (DLPA) to complete a feasibility study for implementing erosion control projects in ravines along the northern portion of the lake. A preliminary review of the area around Dewart Lake identified your parcel of property (attached map) as one we would like to consider for potential projects funded by grant money the DLPA may receive.

There is no obligation on your part to participate. This letter is only meant to ask your permission to access your property. If you grant us permission, we would walk the property in early February, assess whether or not a project to control erosion is feasible, take some measurements necessary for design, and then develop some preliminary sketches for your review. If you concur with the general nature of the project, we will include it with cost estimates in a feasibility report to be submitted to the DLPA. The DLPA will use the report to prioritize projects for funding, seek additional grants for those projects, and implement feasible projects.

Please call me or sign the bottom of this letter and return it to us in the postage paid envelope either granting us access permission or denying us permission. If you have any questions, please contact me or Ken Brehob (574-658-9300) with the DLPA.

Thank you for your consideration.

Mark Pranckus Aquatic Biologist

Yes, I grant permission to access my property

No, I do not grant permission to access my property

Marjorie Knotts, Martha Knotts,

Brian & Doris Wall 3633 E 100 North

Syracuse, IN 46567



708 Roosevelt Road Walkerton, Indiana 46574 Phone: 574-586-3400 ext. 307 Fax: 574-586-3446

Mark Pranckus Aquatic Biologist email: mpranckus@jfnew.com

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Madison, Wisconsin

Native Plant Nursery: Walkerton, Indiana

www.jfnew.com

January, 29 2006

Martha Knotts 5470 N. Illinois St. Indianapolis, IN 46208

RE: Dewart Lake Ravine Stabilization Project

Dear Martha:

Enclosed are the contents of the certified mailing that occurred after December 5, 2006. Please review the letter that outlines the proposed treatment for the eroding ravine and a design drawing of the proposed treatment. If you have any questions, please let me know.

The Dewart Lake Protective Association (DLPA) has applied for a construction grant to move forward with the other projects associated with the feasibility study and would like to include your property as part of the project. JFNew and the Dewart Lake Protective Association appreciate you taking the time to consider the proposed treatment.

Please contact me if you have any questions at 574-586-3400.

Thank you,

Mark Pranckus

CC: JFNew File 03-01-07-01 Kyle Young DLPA Ken Brehob (email) April 20, 2007

re: Dewart Lake Ravine Stabilization Project

Dear JF New:

After careful consideration, we do not plan to participate in the above named project.

Sincerely,

Marjorie J. Knotts Martha E. Knotts

3633 E. 1000N Syracuse, IN 46567



708 Roosevelt Rd Walkerton, Indiana 46574 Phone: 574-586-3400 ext. 338 Fax: 574-586-3446

Mark Pranckus

Aquatic Biologist

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Grand Haven, Michigan

Cincinnati, Ohio

Madison, Wisconsin

Native Plant Nursery: Walkerton, Indiana December 5, 2006

Marjorie and Martha Knotts Brian and Doris Wall 3633 E. 1000 N. Syracuse, IN 46567

RE: Dewart Lake Ravine Stabilization Project

Dear Responsible Parties:

The Dewart Lake Protective Association is undertaking a ravine stabilization design project along ravines on the northern portion of the Dewart Lake shoreline to reduce erosion and sedimentation into the lake. During the preliminary feasibility-design phase, areas on your property were identified as potential locations for projects. The proceeding paragraph details the intended project. A copy of the proposed design in included with this letter. For the project to proceed with construction, the Dewart Lake Protective Association needs your written signature stating that you understand and agree with the project as it is designed.

Site 7: Rock stabilization and riser installation

The proposed design pertains to the small ravine at the base of the hill, north of EMS D12 Lane. The proposed design calls for lining the eroding portion of the ravine with rip-rap to a depth of 1 foot above the current grade. Rip-rap will be added to a height of 2 feet along the portion parallel with EMS D12 Lane. An eight-inch diameter vented riser will be tied into an existing culvert to provide stormwater storage. The result of this project will be to slow stormwater down and reduce erosion and sedimentation.

The Dewart Lake Protective Association is responsible for all costs associated with the construction of this project including site preparation, construction, and clean-up. By signing this letter, you indicate that construction can occur. We will contact you to let you know when we have received funding for the project and the proposed project construction timeline. All contractors having access to the site will be required to have liability insurance.

Please, return a signed copy of the letter in the postage paid envelope and keep a copy for your records. If you have any questions, please contact me at 574-586-3400.

Mark Pranckus

I agree with the proposed design as it has been explained to me by the Dewart Lake Protective Association and/or their representative, JFNew, and by the documentation they have provided. I agree to grant access to the site to allow for construction of this project.

(Printed Name)

Date

www.jfnew.com